

**APPLECOLOR COMPOSITE MONITOR IIe/IIc  
and COLOR MONITOR IIe/IIc  
TECHNICAL PROCEDURES**

Except for case color, the AppleColor Composite Monitor IIe is identical to the ColorMonitor IIe, Series "H," and the AppleColor Composite Monitor IIc is identical to the ColorMonitor IIc, Series "S." In both cases, the procedures for the AppleColor Composite Monitor are the same as for the corresponding ColorMonitor.



**APPLECOLOR COMPOSITE MONITOR IIe/IIc  
AND COLORMONITOR IIe/IIc TECHNICAL PROCEDURES**

**TABLE OF CONTENTS**

**Section 0 - Service Notes**

Upgrade Procedure for Fuse F901 (to 4 Amp 125V).....	0.5
LED Polarity Reversal Procedure - Series H.....	0.9

**Section 1 - Basics**

Product Description.....	1.3
Version Identification.....	1.4
Safety Precautions.....	1.5
Disposing of the Cathode-Ray Tube (CRT).....	1.9

**Section 2 - Troubleshooting**

Introduction.....	2.2
Troubleshooting Guide.....	2.3

**Section 3 - Take-Apart**

**Series "S"**

Removing the Rear Cover (IIc only).....	3S.3
Removing the Rear Cover (IIe only).....	3S.5
Discharging the Cathode Ray Tube (CRT).....	3S.7
Removing and Replacing Procedures:	
Main Logic PCB.....	3S.9
Power Supply/Panel/AC Cord Assembly.....	3S.17
Cathode Ray Tube (CRT).....	3S.19
Control PCB.....	3S.21
White Only Switch.....	3S.23
On/Off Switch (IIc only).....	3S.25
On/Off Switch (IIe only).....	3S.27
Power Supply Fuse (F871).....	3S.29
Replacing the Rear Cover (IIc only).....	3S.31
Replacing the Rear Cover (IIe only).....	3S.33

©Apple Computer, Inc., 1986, 1987.

No part of this document may be reproduced in any form without the written permission of Apple Computer, Inc.

AppleColor is a trademark of Apple Computer, Inc.  
Apple and the Apple logo are registered trademarks of Apple Computer, Inc.

### **Section 3 - Take-Apart (CONTINUED)**

#### **Series "H"**

Removing the Rear Cover (for IIc).....	3H.3
Removing the Rear Cover (for IIe).....	3H.5
Discharging the Cathode Ray Tube (CRT).....	3H.7
Removing and Replacing Procedures:	
Main Logic PCB.....	3H.9
Cathode Ray Tube (CRT).....	3H.21
LED Assembly (for IIc).....	3H.25
LED Assembly (for IIe).....	3H.27
Logic Board Fuses (F901 and F902).....	3H.29
Replacing the Rear Cover (for IIc).....	3H.31
Replacing the Rear Cover (for IIe).....	3H.33

### **Section 4 - Adjustments**

Introduction.....	4.3
Text (Black & White) Adjustments.....	4.5
Color Adjustments	
Materials Needed.....	4.7
Adjustment Procedure Series "S".....	4.7
Adjustment Procedure Series "H".....	4.11

### **Section 5 - Illustrated Parts List**

IIe Monitors	
Colormonitor IIe, Series "S".....	5.3
AppleColor Composite Monitor IIe and Colormonitor IIe, Series "H".....	5.5
IIc Monitors	
AppleColor Composite Monitor IIc and Colormonitor II, Series "S".....	5.7
Colormonitor IIc, Series "H".....	5.9
ColorMonitor IIe/IIc, Series "H"	
Packaging.....	5.11

**Apple ColorMonitor IIe/IIc  
Technical Procedures**

**Section 0**

**Service Notes**

**Contents:**

Upgrade Procedure for Fuse F901 (to 4 Amp 125V).....	0.5
LED Polarity Reversal Procedure - Series H.....	0.9



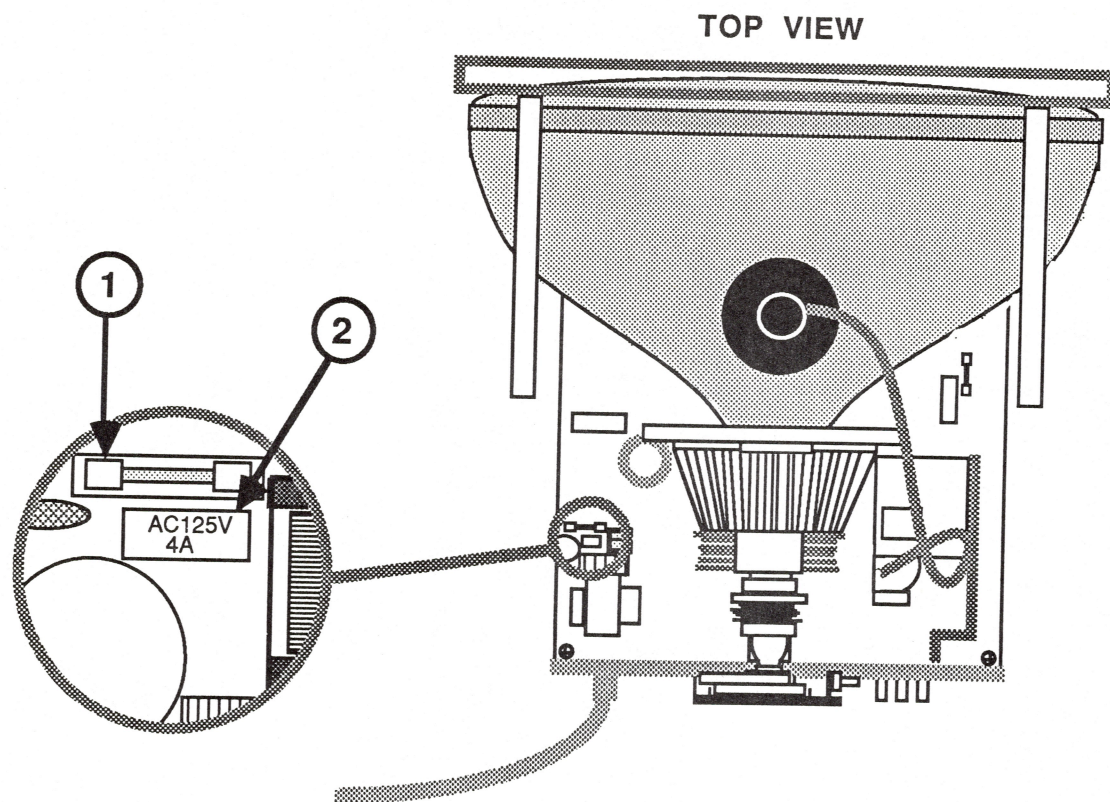


FIGURE 1

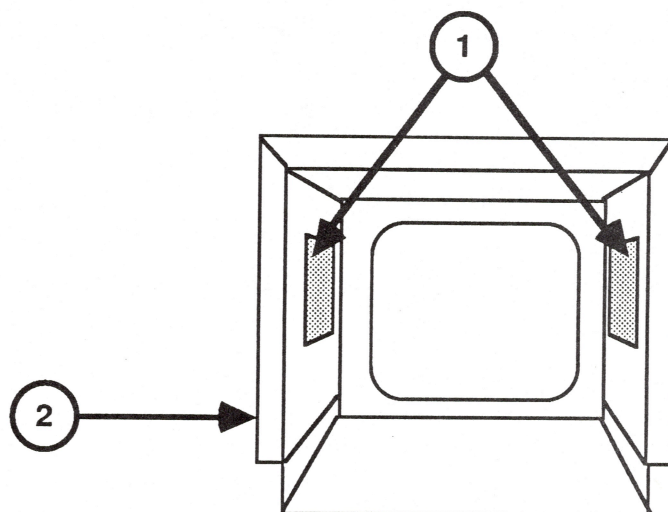


FIGURE 2



## UPGRADE PROCEDURE FOR FUSE F901 (to 4 Amp 125V) - Series H

**SERVICE NOTE:** After extensive testing, the 3.15 Amp 250V fuse (F901) in the ColorMonitor IIe/IIc (Series H) has been shown to have a 1% failure rate. All 3.15 Amp fuses must be replaced with 4 Amp 125V fuses when they fail, or when any type of monitor problem occurs (for instance, when CRT is replaced). Also, you should replace any 3.15 Amp fuse that is currently in your Miscellaneous Hardware Kit with a new 4 Amp 125V fuse.

The Fuse Kit for the ColorMonitor IIe/IIc includes:

The correct 4 Amp 125 V medium blow fuse  
Two large labels (in English and French)  
for the inside of the monitor case  
One small label for the logic board  
Installation instructions

**IMPORTANT:** If you have not completed steps 1 through 4 of "Replacing the Logic Board Fuses (F901 and F902) - Series H" (in **Section 3, Take-Apart**), you must do so now before beginning this procedure.

1. Replace fuse F901 (Figure 1, #1) with the new 4 Amp 125V fast blow fuse.
2. Attach the small label (Figure 1, #2) below the fuse holder (F901).
3. Attach the two large labels (Figure 2, #1) over the existing labels to the inside wall of the ColorMonitor rear cover (Figure 2, #2).

**NOTE:** The label on the left side is written in French and the one on the right in English. Be sure to attach each label to its proper position.

4. Carefully set the monitor on its face on a protective pad.

**CONTINUE ON NEXT PAGE**

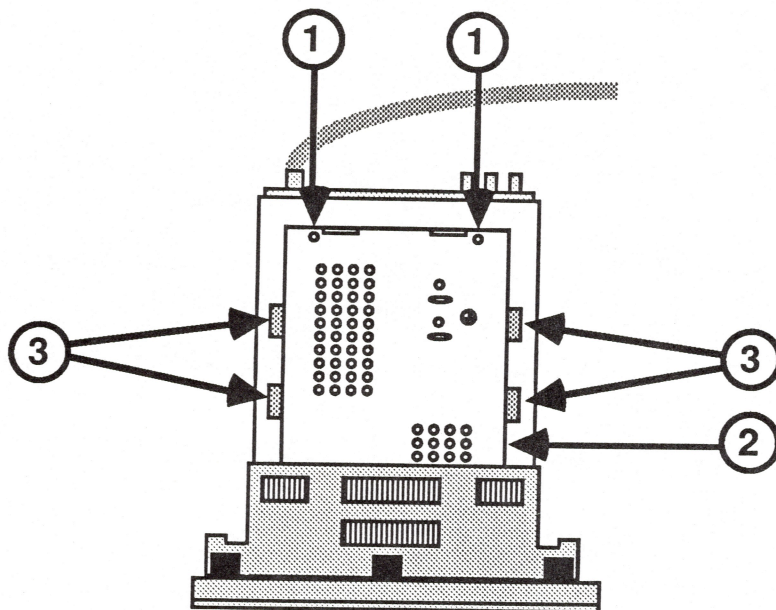


FIGURE 3

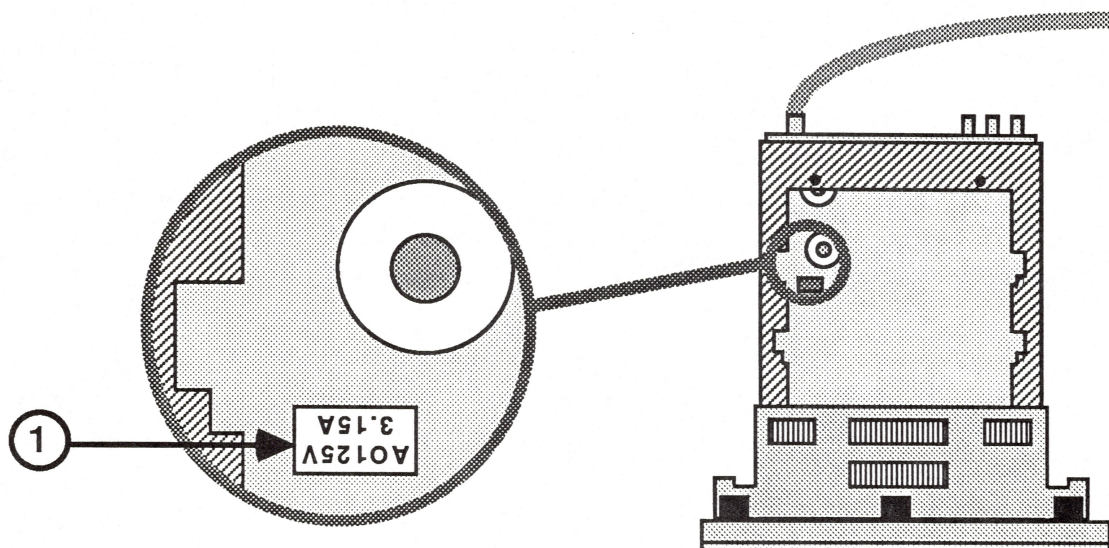


FIGURE 4



5. Remove the two screws (Figure 3, #1) that secure the bottom panel of the main logic PCB.
6. Remove the bottom panel (Figure 3, #2) from the main logic PCB.
7. Use a dark colored felt pen to blacken out the fuse information (Figure 4, #1) on the main logic PCB.
8. Replace the bottom panel and secure the two screws (Figure 3, #1) to the main logic PCB. Make sure that the four metal teeth (Figure 3, #3) are aligned before tightening the screws.
9. Replace the rear cover. (See "Replacing the Rear Cover" in **Section 3, Take-Apart.**)
10. Connect the AC power cord.

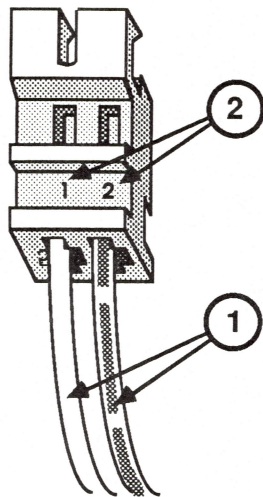


FIGURE 5

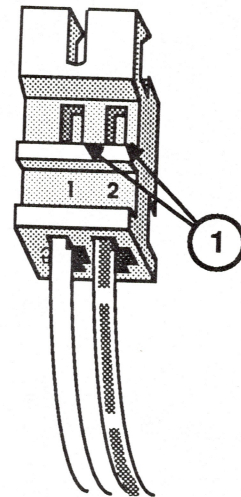


FIGURE 6

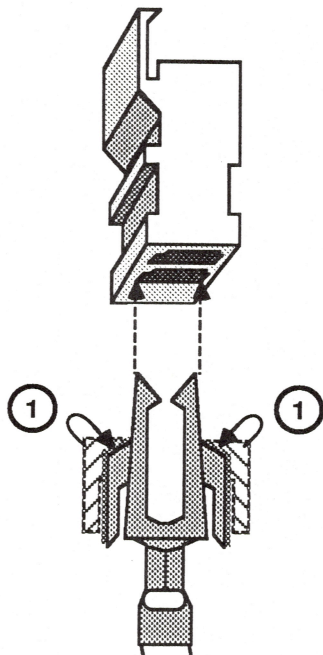


FIGURE 7

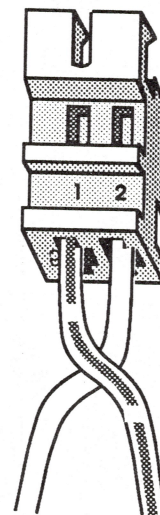


FIGURE 8



## LED POLARITY REVERSAL PROCEDURE - SERIES H

On the ColorMonitor IIe, Series H, the polarity of the LED circuitry on the Rev. B logic board is reversed from that of the Rev. A. If you have made a logic board replacement and find that the LED does not work, follow the procedure below.

1. Remove the cover and discharge the CRT. (See **Section 3, Take-Apart.**)
2. Disconnect the LED connector from the logic board (for Rev. B) or from the small, vertically mounted video PCB attached to the logic board (for Rev. A). (For position of connector on board, refer to "Removing the Main Logic PCB - Series H" in **Section 3, Take-Apart.**)

**NOTE:** The LED does **not** have to be removed from the bezel for this procedure.

3. The LED leads are color-coded (Figure 5, #1). Note which color is in which numbered side (Figure 5, #2).
4. Using the tip of a screwdriver, press in on the two small holes on each side of the connector (Figure 6, #1) to compress the metal lead tabs inside.
5. Pull the lead tabs out of the connector (Figure 7).
6. Straighten out the little metal teeth on the edges of the tabs where they were bent by the screwdriver tip (Figure 7, #1). These teeth must be separated enough from the tabs to snap back onto the connector holes on reinsertion.
7. Reverse the position of the leads and replace them in the connectors according to the orientation shown by the dotted lines in Figure 7. Push the leads in until the teeth snap into the connector holes (Figure 8). Tug on the leads to make sure they are seated securely.
8. Reconnect the LED connector to the logic board (Rev. B) or small video PCB (Rev. A). (Refer to "Replacing the Main Logic PCB - Series H" in **Section 3, Take-Apart.**)
9. Replace the cover. (See **Section 3, Take-Apart.**)
10. Power on the monitor to make sure the LED lights. If it does not, replace the LED.

# Apple ColorMonitor IIe/IIc Technical Procedures

## Section 1

### Basics

#### Contents:

Product Description.....	1.3
Version Identification.....	1.4
Safety Precautions.....	1.5
Disposing of the Cathode-Ray Tube [CRT].....	1.9

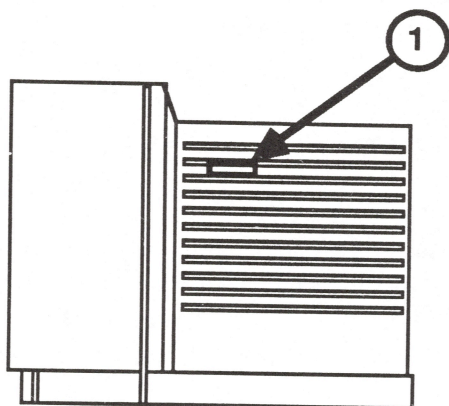


FIGURE 1

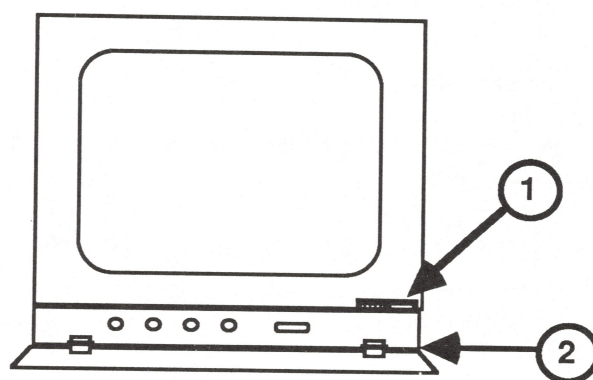
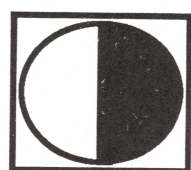
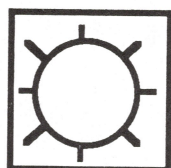


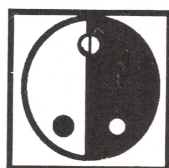
FIGURE 2



CONTRAST



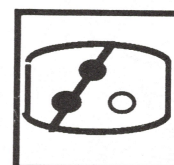
BRIGHTNESS



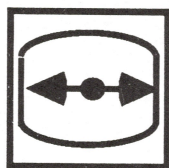
COLOR



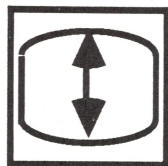
TINT



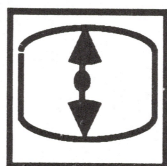
WHITE ONLY



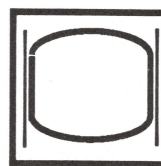
H-HOLD



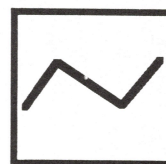
HEIGHT



V-HOLD



VID INPUT



AC POWER

FIGURE 3



## PRODUCT DESCRIPTION

The AppleColor Composite Monitor IIe/IIc (formerly called the ColorMonitor IIe/IIc) is a 14-inch display monitor operated with a composite video input signal. This means that it uses a standard RCA phono jack to connect the monitor input to the computer's video output jack. The power switch for the IIc version is on the top right side of the case (as you face the screen). It will stay depressed when the unit is on (Figure 1, #1). The power switch for the IIe version is at the front of the monitor on the lower right side (Figure 2, #1).

For both the IIe and the IIc versions of the monitor, frequently used controls are located behind a protective door (Figure 2, #2) on the bottom front of the monitor. Less frequently used controls are on the back of the monitor. Internationally recognized symbols, shown in Figure 3, are used to identify the various controls.



## VERSION IDENTIFICATION

Two vendors supplied Apple with the ColorMonitor IIe/IIc. The two vendors' interior designs are referred to "Series S" and "Series H." Both vendors manufactured both case versions: the IIe case version in beige and the IIc case version in white. So, originally, we had four versions:

ColorMonitor IIe, Series S (beige)  
ColorMonitor IIc, Series S (white)

ColorMonitor IIe, Series H (beige)  
ColorMonitor IIc, Series H (white)

When the case color for both the IIe and the IIc was changed to platinum, the name was changed also -- to the AppleColor Composite Monitor IIe/IIc. At the same time, the production of new monitors was segmented by vendor so that the new AppleColor Composite Monitor IIc appears only in the Series S design, and the new AppleColor Composite Monitor IIe appears only in the Series H design. So, to the original four above, we add:

AppleColor Composite Monitor IIc, Series S only (platinum)  
AppleColor Composite Monitor IIe, Series H only (platinum)

Finally, there are two versions (Rev. A and Rev. B) of the Series H logic board (both in finished goods monitors and in service modules). The major differences between the two revisions are given below:

### Rev. A

Rear panel/AC power cord  
assembly detaches from  
logic board  
(two separate modules)

Separate power supply board

Separate video board

Isolation transformer on AC  
power circuit

### Rev. B

Power cord soldered to  
logic board  
(one module)

Logic board design  
includes power supply  
and video functions

**NO ISOLATION TRANSFORMER:  
DANGEROUS IF PLUGGED IN  
BACKWARDS!**

## **SAFETY PRECAUTIONS**

The AppleColor Composite Monitor IIe/IIc (ColorMonitor IIe/IIc) is harmless as long as you're just watching the display. Removing the cover, however, exposes you to the high-voltage Cathode-Ray Tube (CRT)--the picture tube. The following precautions must be taken to ensure your safety, especially when you are performing live adjustments on the monitor.

### **Safe Electrical Setup**

1. **Be sure your outlet is correctly wired and properly grounded.**

Polarity and ground testers are available from most electronics stores. Test all outlets in your service area before working on **any** electrical equipment. If you have any doubts about your building's wiring, consult a qualified electrician.

2. **Never use an adaptor plug to connect a monitor's three-prong power plug to a two-prong wall outlet.**

Adaptors defeat the ground pin, which is a safety feature.

3. **Use an isolation transformer between the monitor and the outlet when performing live adjustments.**

Order an isolation transformer from your electronics distributor, and make it a practice to use it whenever you are working with **any** charged monitor or other powered system under test. An isolation transformer isolates the circuitry of the system under test from the power company's circuitry, reducing the likelihood of a fatal shock should you simultaneously contact high voltage and anything else that is earth-grounded.

Do not connect more equipment to the transformer than the wattage capacity of the transformer will bear. (It is usually best to connect only one piece of equipment at a time.) We recommend an isolation transformer with a minimum wattage capacity of 500 VA, with a grounded three-prong cord and receptacle. Two such transformers, available from many electronics stores and distributors, are listed below:

Triad N-57M

Stancor GIS 500



## **CRT Safety Rules**

- 1. Do not work on a monitor alone.**

In case of accident, it could save your life to have someone else nearby. Apple recommends that your staff be trained in Cardio-Pulmonary Resuscitation (CPR).

- 2. Remove rings, watches, bracelets, hanging necklaces, and other jewelry before performing repairs on a monitor.**

Metal jewelry is an excellent conductor of electricity. Removing jewelry will reduce the possibility of electric shock.

- 3. Never use a grounding wriststrap or heelstrap or work on a grounded workbench mat when discharging a monitor or when performing live adjustments.**

Grounding wriststraps, heelstraps, and mats are used to protect sensitive components from the damaging effects of electrostatic discharge from your own body or clothing. Even though they contain a one-megohm resistor and are designed to conduct only small electrical charges, we recommend that they be used **only** when working on "dead" (uncharged) equipment.

- 4. Wear safety goggles when working with a CRT.**

The CRT contains a high vacuum. If cracked or broken, it can implode (collapse into itself, then explode). To protect your eyes from serious injury, always wear safety goggles when working on or near a CRT, and be careful of other people in the area.

- 5. Before working inside a monitor, turn off the power and disconnect the AC power cord.**

Certain parts of a monitor chassis are hot (electrified) when the monitor is under power. Except when you must have the power on (for example, when making live adjustments), never work on a plugged-in monitor--even if you have the power turned off.

- 6. Keep one hand in your pocket or behind your back when working on a live monitor.**

This practice reduces the risk of current passing through your heart, should you accidentally contact high voltage.

7. **Always discharge the anode before touching anything inside the monitor.**

The anode of the CRT maintains a charge of about 24,000 volts DC (even when the power is off). Before touching any internal components you must discharge this voltage. The anode can regain some charge, even after it has been discharged. If the service procedure takes more than 30 minutes, the anode should be discharged again.

8. **Never touch the anode connector or the anode aperture.**

Normally the anode aperture (Figure 4, #1) has a connector plugged into it (Figure 4, #2). When a CRT is replaced, the anode connector is removed, exposing the anode. The anode can maintain a charge of several thousand volts (even after the power is off).

9. **Do not pick up or handle a CRT by its neck.**

To prevent an implosion, you should take every precaution against breaking the tube. Be especially careful with the neck, the area where the tube is the thinnest.

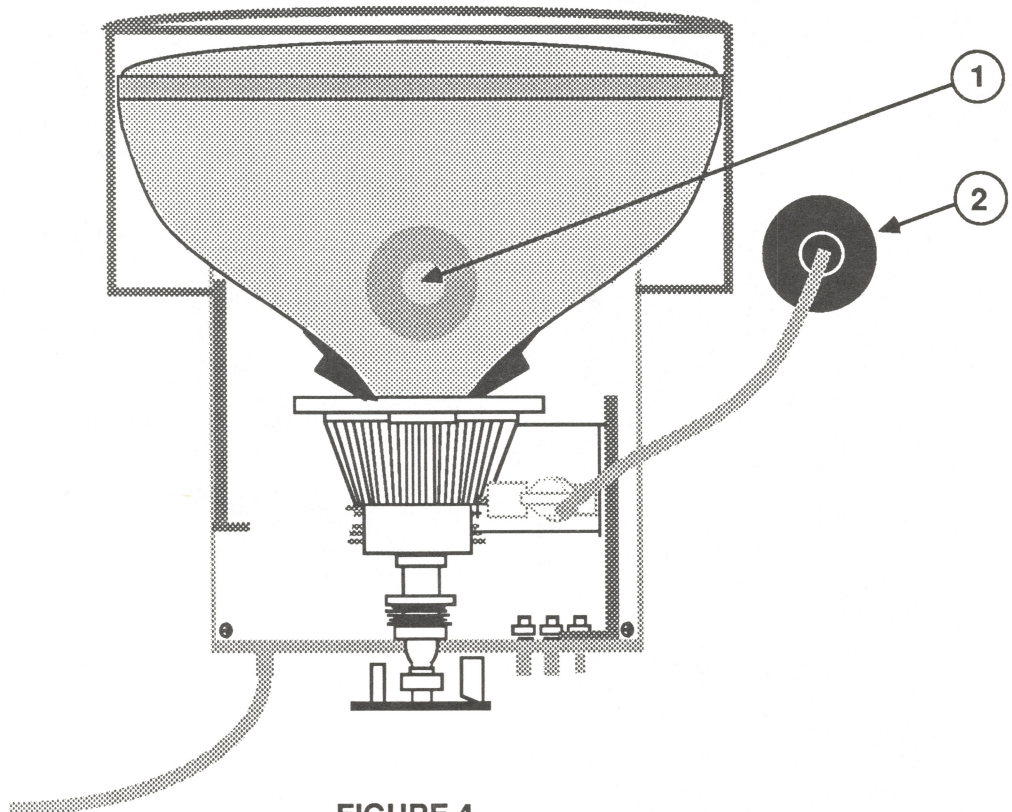


FIGURE 4

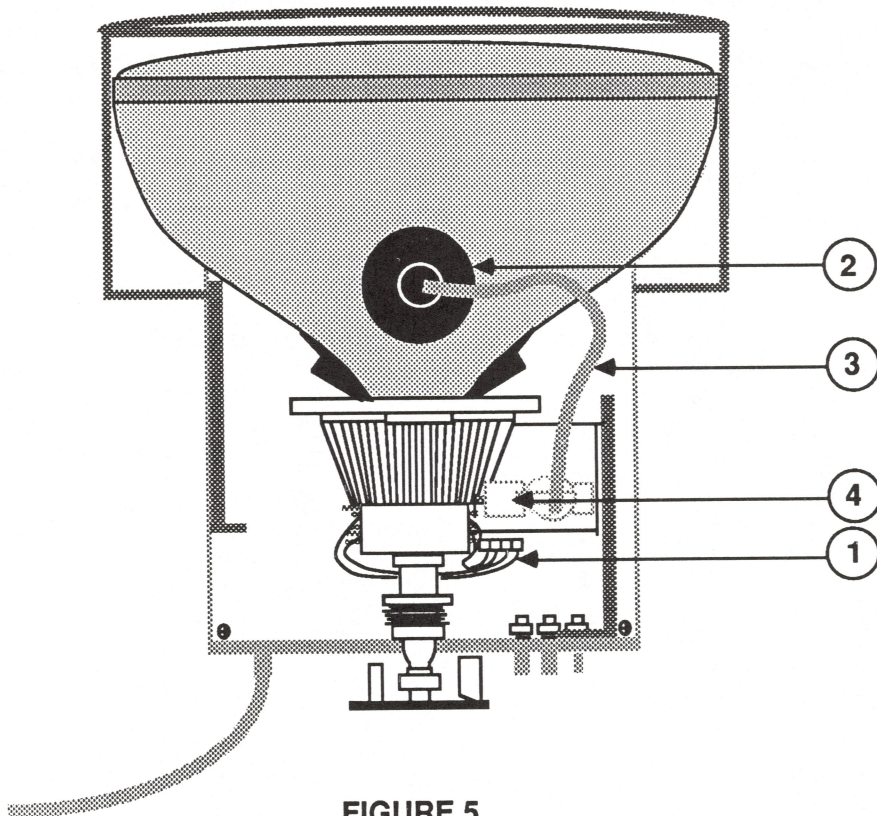


## Live Adjustment Rules

In addition to the precautions listed on the previous pages, never touch the following components when adjusting a live AppleColor Composite Monitor IIe/IIc:

1. The yoke wires (Figure 5, #1)
2. The anode connector (Figure 5, #2)
3. The anode wire (Figure 5, #3)
4. The flyback transformer (Figure 5, #4)

**WARNING:** Serious injury could result if you touch any of these components with the power on.



## DISPOSING OF THE CATHODE-RAY TUBE (CRT)

**WARNING:** Remember that a CRT can implode unless it is devacuumed. Putting a defunct CRT into a trash receptacle without devacuuming it can endanger other people.

### Materials Required

Thick cardboard box large enough to conceal the CRT  
Large, sharp diagonal cutters  
Large pliers  
Duct tape  
Safety goggles  
Gardening gloves  
12-inch square of cloth or heavy paper

### Devacuuming the CRT

1. Put on the safety goggles.
2. In the side of the box about six inches from the bottom, cut or drill a hole just large enough to accommodate the very tip of the CRT.
3. Place the CRT inside the box with the tip of the neck protruding through the hole, and tape the box flaps down with duct tape (Figure 6).

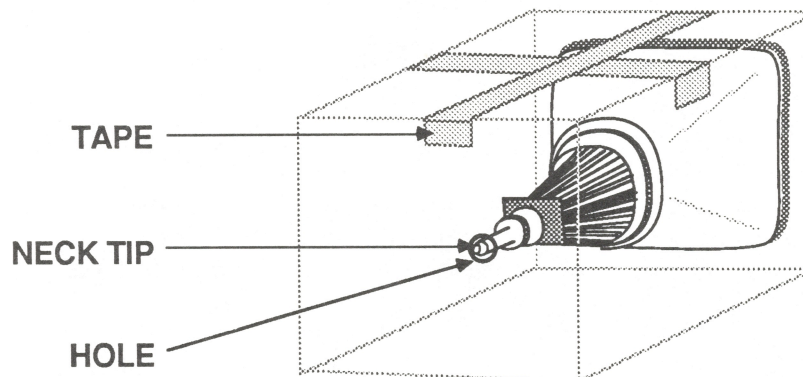
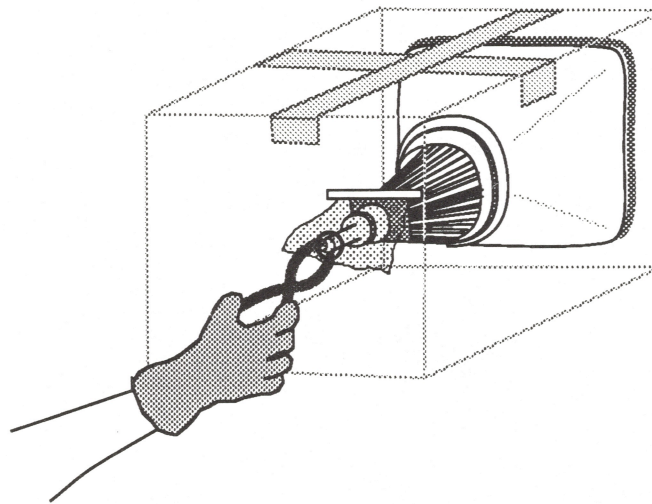


FIGURE 6

**WARNING:** Only the very tip of the CRT neck should be protruding through the hole in the box. The box must not have any other openings.

4. Put on the gloves.
5. Pull off the black plastic guide located at the end of the CRT neck. Using the diagonal cutters, carefully clip off the connector pins on the end of the CRT neck.
6. Tape the piece of cloth or paper onto the box (Figure 7, #1) so that it forms a veil over the opening (Figure 5, #2) but allows your hand access to the tip of the CRT. The veil's purpose is to catch the bits of glass that may fly during the following step.



**FIGURE 7**

7. Make sure no one is standing nearby. Place the pliers under the veil, stand to one side, and look away while you use the pliers to snip off the exposed tip of the CRT.

**WARNING:** Do not look directly at the box when cutting off the tip!

You will probably hear a rush of air entering the CRT when the CRT vacuum breaks--but even if you don't, the procedure is complete if the inner space of the CRT is clearly visible through the opening created by the removed tip.



**Apple ColorMonitor IIe/IIc  
Technical Procedures**

**Section 2**

**Troubleshooting**

Introduction.....	2.2
Troubleshooting Guide.....	2.3

## INTRODUCTION

This troubleshooting section consists of a symptom chart showing each symptom and a list of fixes.

**DO THIS FIRST:** There are two series of ColorMonitor IIe/IIc. Use the following criteria to identify the series of ColorMonitor IIe/IIc that you are troubleshooting:

- \* **Series "S"** monitors have two plastic hinges with metal pins on the lower front door of the monitor.
- \* **Series "H"** monitors have three entirely plastic hinges which bend along a preset crease.

**IMPORTANT TERMS:** There are two parts to the display on a monitor:

**Video** - The information (characters, graphics, etc.) on the display. The video is usually displayed over the raster (described below) so that the raster is not visible.

**Raster** - The lit portion of the screen which is usually covered by video so that it is not visible. When the raster is displayed by itself with no video, it looks like a blank white box.

## DIRECTIONS:

- \* In the table beginning on the opposite page, find the symptom which most closely resembles that exhibited by the defective monitor. Then try the recommended action(s) in the order listed.
- \* If a recommended action specifies **Series "S"** or **Series "H,"** perform it only if your monitor is of that series (refer to DO THIS FIRST above for more information).
- \* If neither **Series "S"** nor **Series "H"** is specified, the recommended action is applicable to both.
- \* If the problem still exists after trying the actions listed, contact your Regional Technical Support Center for assistance.

<b>SYMPTOM</b>	<b>ACTION</b>
NO RASTER	<p>Adjust the external BRIGHTNESS control on front panel.</p> <p><b>Series "S"</b> - Check fuse 871 on the power supply PCB; replace if blown.</p> <p><b>Series "H"</b> - Check fuse 901 on the main logic board; replace if blown.</p> <p>Check that all connectors are secure on power supply and main logic PCBs.</p> <p><b>Series "S"</b> - Replace power supply board.</p> <p><b>Series "S"</b> - Replace rear panel/AC cord.</p> <p>Replace main logic PCB.</p> <p>Replace power switch.</p> <p>Replace CRT.</p>
ONE HORIZONTAL LINE APPEARS	<p><b>Series "S"</b> - Check to make sure that the internal service switch (SW800) is in NORMAL position. Refer to Series "S" color adjustment procedure (in "Adjustments" section) for switch location.</p> <p>Check yoke connector.</p> <p>Replace main logic PCB.</p> <p>Replace CRT.</p>
ONE VERTICAL LINE APPEARS	<p>Check yoke connector.</p> <p>Replace main logic PCB.</p> <p>Replace CRT.</p>
ONE SIDE OF THE RASTER IS A DIFFERENT HEIGHT THAN THE OTHER (keystone effect)	<p>Replace CRT.</p>



SYMPTOM	ACTION
ABNORMAL RASTER (other than above)	Check to make sure all connectors are correctly seated and in right places on the PCBs.  Replace main logic PCB.
HORIZONTAL LINEARITY BAD	Replace main logic PCB.
MONITOR MAKES HIGH PITCHED NOISE	Replace main logic PCB.  <b>Series "S"</b> - Replace power supply board.
RASTER IS SMALL AND ABNORMALLY BRIGHT	Check yoke connector.  Replace main logic PCB.  Replace the CRT.
NO VERTICAL SYNCHRONIZATION	Set external VERTICAL HOLD control on back panel.  Replace main logic PCB.
RASTER NOT CENTERED	Replace main logic PCB.
CAN'T ADJUST COLOR, CONTRAST, BRIGHTNESS, ETC.	Replace main logic PCB.
CHARACTERS JITTER	Make sure all ground straps are secure.  Verify adjacent computer equipment is properly grounded.  <b>Series "S"</b> - Replace power supply PCB.  Replace main logic PCB.
VERTICAL LINEARITY BAD	Replace main logic PCB.
BLACK SPOT REMAINS WHEN UNIT IS OFF (burnt phosphor)	Replace CRT.

SYMPTOM	ACTION
PICTURE TOO DARK OR TOO BRIGHT	Adjust external BRIGHTNESS control (on front panel).  Series "S" - Adjust internal SUB-BRIGHTNESS control. Refer to Series "S" color adjustment procedure (in "Adjustments" section) for location.  Replace main logic PCB.
OUT OF FOCUS	Replace main logic PCB.  Replace CRT.
RASTER IS ONE PREDOMINANT COLOR	See color adjustment procedure (in "Adjustments" section).  Replace main logic PCB.
NO COLOR	Make sure that software is supposed to display in color.  Make sure WHITE ONLY switch is in "out" position.  Replace main logic PCB.
INCORRECT COLORS	If colors are <u>very seriously</u> out of adjustment, adjust internal color controls (see "Adjustments" section).
MONITOR TURNS ITSELF OFF	Replace main logic PCB.
FLASHING OR WAVY SCREEN	Gently crimp the metal connector tabs on the video connector.

# Apple ColorMonitor IIe/IIc Technical Procedures

## Section 3

### Take-Apart

#### Series "S"

#### Contents:

Removing the Rear Cover (for IIc).....	3S.3
Removing the Rear Cover (for IIe).....	3S.5
Discharging the Cathode Ray Tube (CRT).....	3S.7
Removing and Replacing Procedures:	
Main Logic PCB.....	3S.9
Power Supply/Panel/AC Cord Assembly.....	3S.17
Cathode Ray Tube (CRT).....	3S.19
Control PCB.....	3S.21
White Only Switch.....	3S.23
On/Off Switch (for IIc).....	3S.25
On/Off Switch (for IIe).....	3S.27
Power Supply Fuse (F871).....	3S.29
Replacing the Rear Cover (for IIc).....	3S.31
Replacing the Rear Cover (for IIe).....	3S.33

**NOTE:** For Series "H" Take-Apart, see the next section, beginning on page 3H.1.



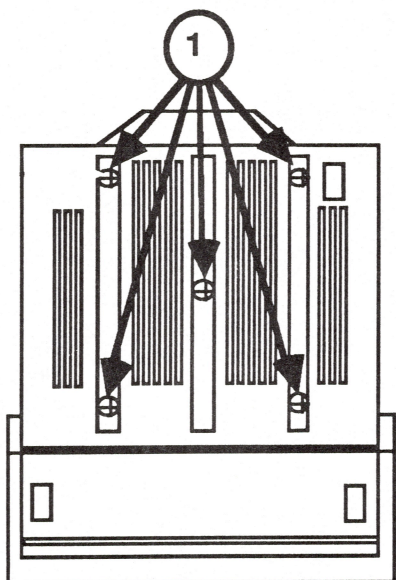


FIGURE 1

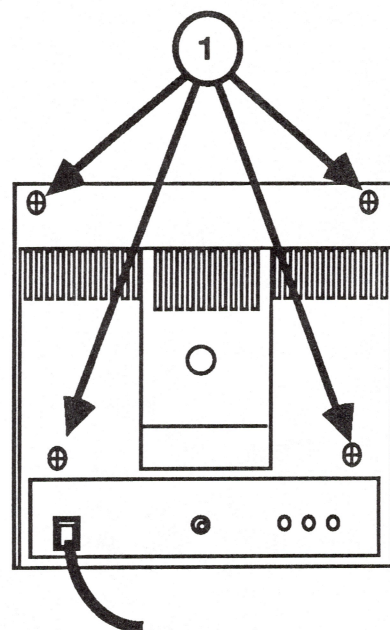


FIGURE 2

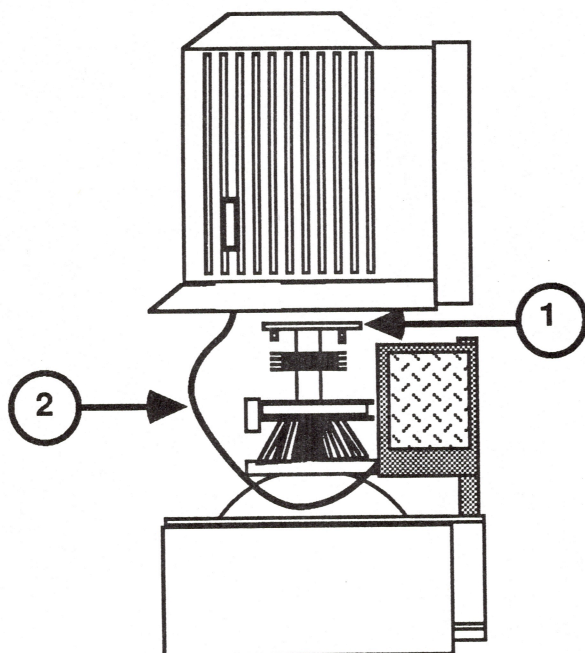


FIGURE 3

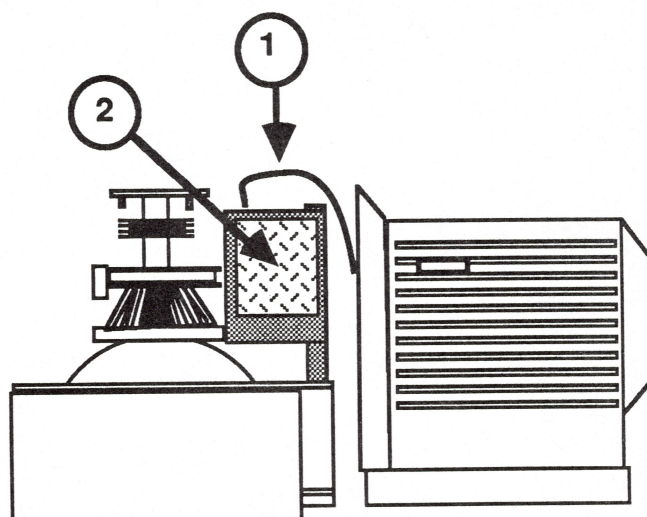


FIGURE 4

## REMOVING THE REAR COVER (IIc ColorMonitor only) - Series "S"

1. Turn the monitor off and disconnect the power cord.
2. Disconnect the video cable from the back of the monitor.
3. Carefully set the monitor on its face (screen side) so that the back is facing up. (**NOTE:** The ColorMonitor contains sensitive components that can be damaged by rough treatment. Whenever it is necessary to turn the monitor over, be sure to rest it on a protective pad.)
4. Remove the five screws (Figure 1, #1) from the bottom of the monitor.

**NOTE:** There may be antistatic rubber grommets covering the bottom case screws. If so, you will need to remove them (using a jeweler's screwdriver or needlenose pliers) before you can remove the screws.

5. Remove the four screws (Figure 2, #1) from the back of the monitor.
6. Carefully pull the rear cover up until it clears the CRT socket board (Figure 3, #1) at the end of the CRT neck.

**CAUTION:** Because the power switch is attached to the rear cover, the cover cannot be completely removed until the switch cable (Figure 3, #2) is disconnected from the power supply board, as directed in Step 9 below.

7. Set the rear cover right next to the monitor as shown in Figure 4.
8. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube [CRT]," in this section.)
9. Follow the power switch wire (Figure 4, #1) from the switch (inside the rear cover) to its connector on the power supply board. Disconnect the power switch connector from CN11 on the power supply board (Figure 4, #2).

**NOTE:** The connectors (CN) are labeled on both sides of the power supply board.

10. Pull the AC power cord through the opening in the rear cover. Set the rear cover aside.



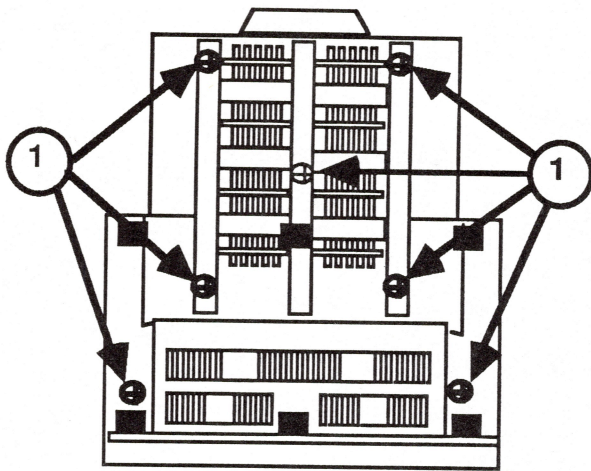


FIGURE 5

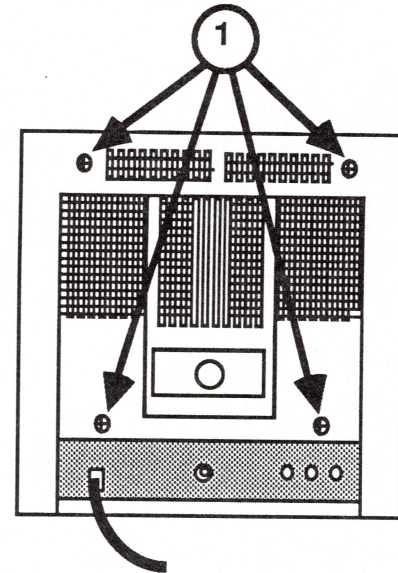


FIGURE 6

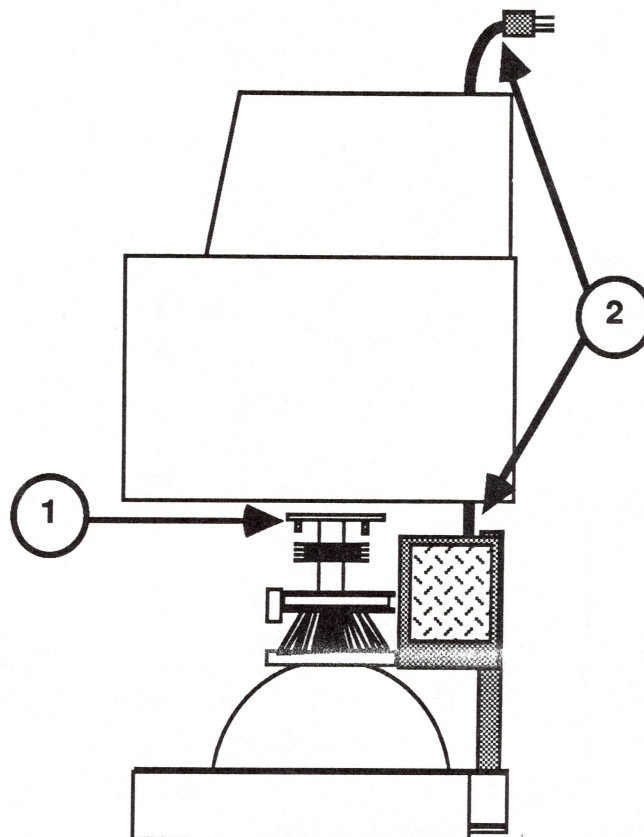


FIGURE 7



### REMOVING THE REAR COVER (IIe ColorMonitor only) - Series "S"

1. Turn the monitor off and disconnect the AC cord.
2. Disconnect the video cable from the back of the monitor.
3. Carefully set the monitor on its face on a protective pad.
4. Remove the seven screws (Figure 5, #1) from the bottom of the monitor.
5. Remove the four screws (Figure 6, #1) from the back of the monitor.
6. Carefully pull the rear cover up until it clears the CRT socket board (Figure 7, #1).
7. Pull the AC power cord (Figure 7, #2) through the opening in the rear cover.
8. Set the rear cover aside.

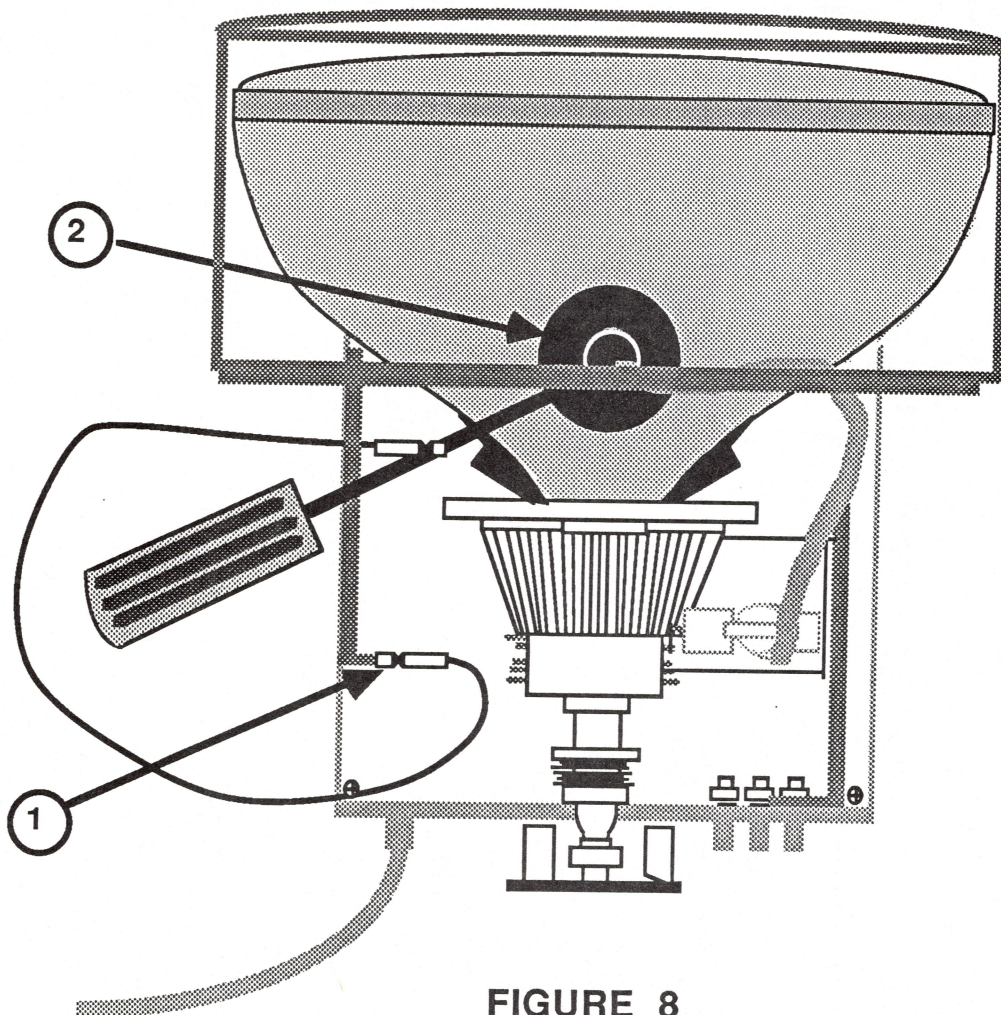


FIGURE 8



## DISCHARGING THE CATHODE RAY TUBE [CRT] - Series "S"

1. Turn off the monitor and disconnect the AC power cord.
2. Remove the rear cover. ("See Removing the Rear Cover.")
3. Set the monitor upright, with the back facing you.
4. Remove any metal jewelry (rings, watches, bracelets, hanging necklaces, etc.) and grounding wriststraps.
5. Put on safety goggles.
6. Attach one end of an alligator lead to a long flatblade screwdriver, two inches from the insulated handle. Attach the other end to any part of the metal bracket surrounding the power supply board. (Figure 8, #1.)

**WARNING: USE ONLY ONE HAND WHILE DISCHARGING THE CRT.** This is to eliminate any chance of your becoming a path for current should your hand slip and touch the metal part of the screwdriver. Grasp only the insulated handle of the screwdriver while discharging the CRT.

7. Slide the screwdriver under the CRT anode cap (Figure 8, #2) and push it towards the center of the cap until the blade contacts the metal anode ring.

**CAUTION: DO NOT USE FORCE.** If it is difficult to get the screwdriver under the anode cap, use a smaller screwdriver to loosen the suction of the anode cap on the tube. Discharge the anode by holding the large screwdriver against the anode ring for five seconds.

8. Remove the screwdriver and disconnect it from the alligator clip.
9. Peel back the anode cap until you can see the anode ring at the center. Look at the metal connector in the center of the cap and notice how it is clipped into the CRT. Push on the cap in one direction, freeing the metal connector from the CRT, and lift the cap off the tube.

**NOTE:** A secondary charge can build up even after you have discharged the CRT. To ensure that any residual charge is dissipated during the service procedure, establish a ground lead by fastening one alligator clip to the metal chassis and the other clip to the edge of the anode aperture.



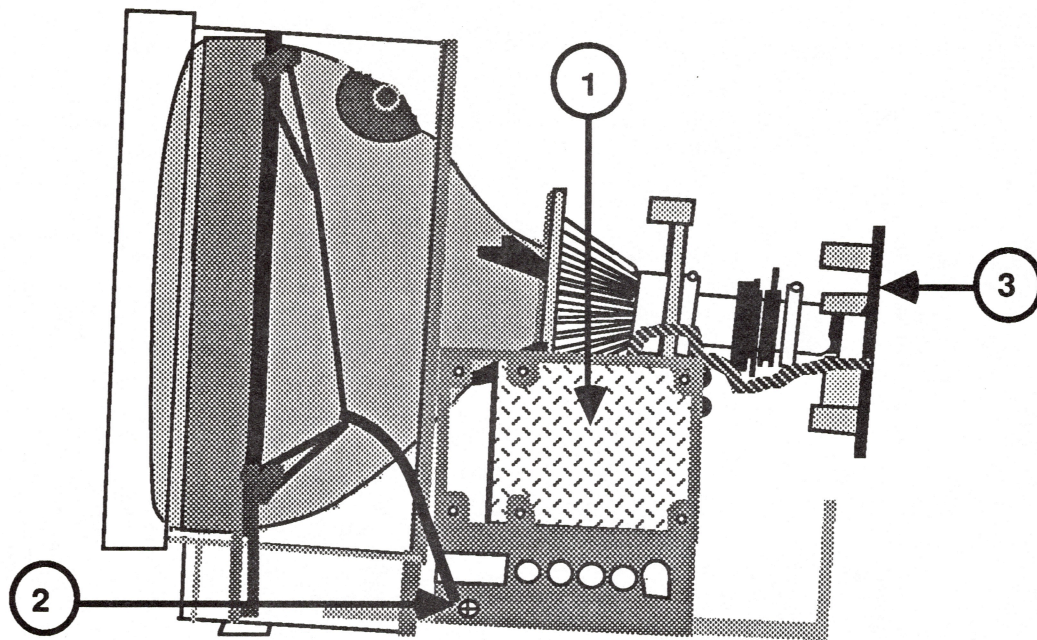


FIGURE 9

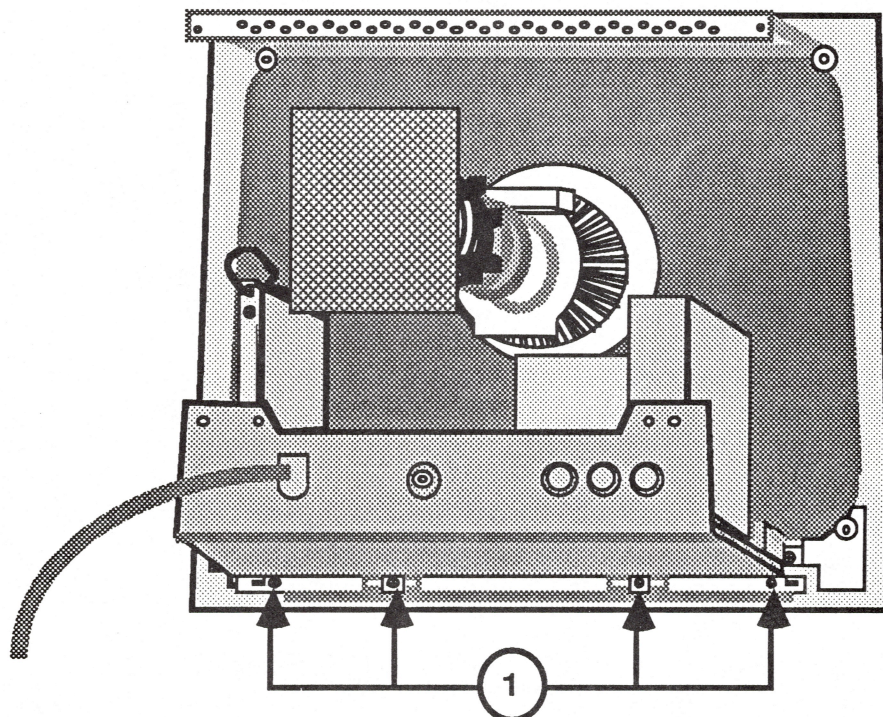


FIGURE 10

## REMOVING THE MAIN LOGIC PCB - Series "S"

1. Turn off the monitor and unplug the AC cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube [CRT].")
4. Locate the power supply board (Figure 9, #1).
5. Carefully disconnect all three connectors (CN9, CN10, and CN11) from the power supply board. (Refer to the labels on the outside of the board.)
6. Set the monitor face down (screen side down) on a protective pad.
7. Remove the four screws (Figure 10, #1) located between the bottom of the metal frame and the plastic case.

**NOTE:** These are the only four screws securing the main logic PCB to the case.

8. Support the board with one hand as you tilt the monitor until it is sitting upright (on its feet). Turn the monitor so that the back is facing you.
9. Remove the screws (Figure 9, #2) which secure the CRT ground straps to both sides of the main chassis. (There is one screw on each side.)
10. Carefully pull the CRT socket board (Figure 9, #3) away from the CRT neck until it clears the neck base.
11. Cut any cable ties binding the CRT socket board wires together.
12. Remove all wires from the plastic cable clamp at the right of the CRT neck, just above the flyback transformer.



FIGURE 11

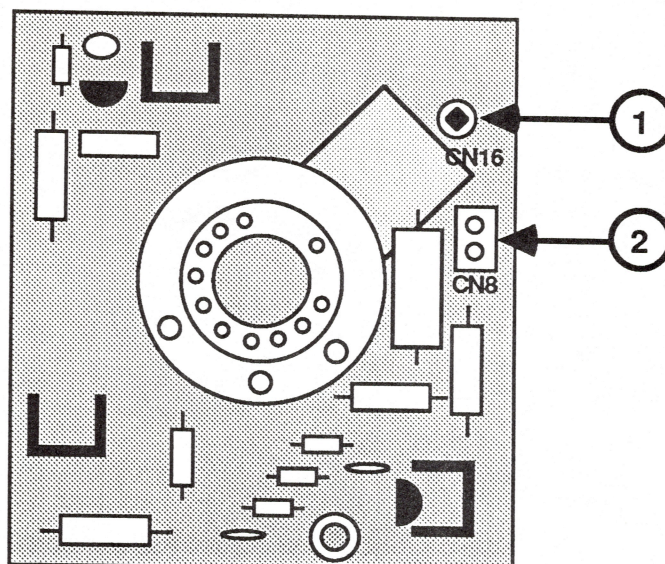
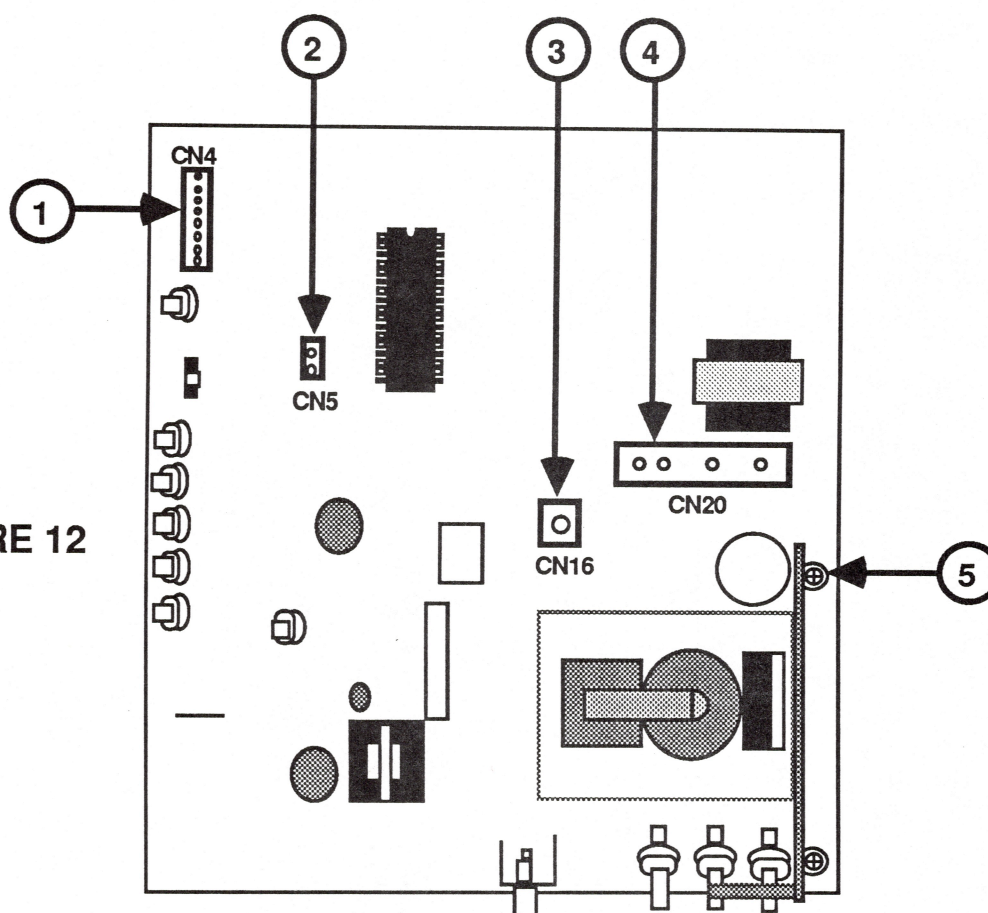


FIGURE 12

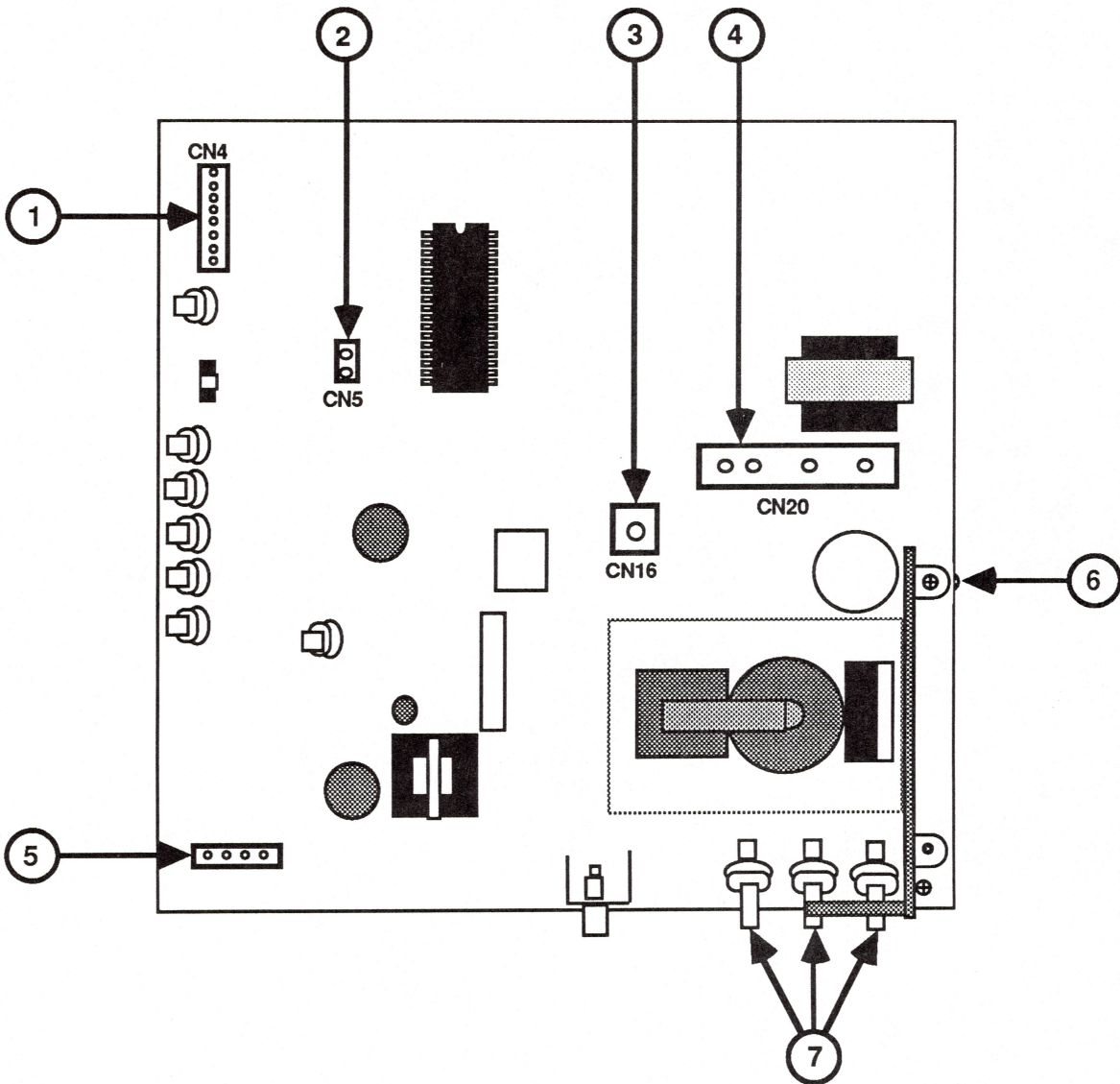




13. Turn the socket board so that you can see the component side, as shown in Figure 11.
14. Disconnect CN16 (Figure 11, #1) from the CRT socket board.
15. Very carefully slide the main logic PCB about three inches away from the front of the monitor.
16. Disconnect the following connectors from the main logic PCB:
  - a) CN4 -- Figure 12, #1
  - b) CN5 -- Figure 12, #2
  - c) CN16 -- Figure 12, #3
  - d) CN20 -- Figure 12, #4
17. Set the main logic PCB (with power supply board) aside.

**IMPORTANT:** Before returning the logic board to Apple, remove the two screws (one from above, one from below) that hold the rubber standoff (Figure 12, #5) in place between the logic board and the metal chassis, and remove the standoff. (Leaving the standoff in place during shipment may cause cracking of the board.) Reinstall the standoff and screws on the replacement logic board module.

If you are returning the main logic PCB to Apple, you must first also remove the power supply/panel/AC cord assembly and the three rear control knobs from the main logic PCB. See "Removing the Power Supply/Panel/AC Cord Assembly" for instructions.



**FIGURE 13**



## REPLACING THE MAIN LOGIC PCB - Series "S"

**IMPORTANT:** Before placing the logic board into the chassis, you must first install several items on the logic board.

- A. The power supply board must be mounted to its bracket. (See "Replacing the Power Supply/Panel/AC Cord Assembly" for instructions.)
- B. The rubber standoff that you removed from the defective board must be reinstalled. To do this, reinstall the two screws (one from above, one from below) that hold the rubber standoff (Figure 13, #6) in place between the logic board and the metal chassis.
- C. The three rear plastic control knobs (Figure 13, #7) that you removed from the defective logic board must be replaced.
- D. The power supply/panel/AC cord assembly must be replaced. (See "Replacing the Power Supply/Panel/AC Cord Assembly" for instructions.)

To replace the prepared logic board in the chassis:

- 1. Set the main logic board under the CRT neck about three inches away from the base of the CRT.
- 2. Connect the following connectors to the main logic PCB:
  - a) CN4 -- Figure 13, #1 (the connector from the control PCB at the front of the monitor)
  - b) CN5 -- Figure 13, #2 (the connector from the White Only switch at the front of the monitor)
  - c) CN16 -- Figure 13, #3 (the black wire coming off the silver ground strap surrounding the CRT)
  - d) CN20 -- Figure 13, #4 (the large connector coming off the CRT neck)
  - e) CN14 -- Figure 13, #5 (the connector with four colored wires that are soldered at the other end to the CRT socket board)



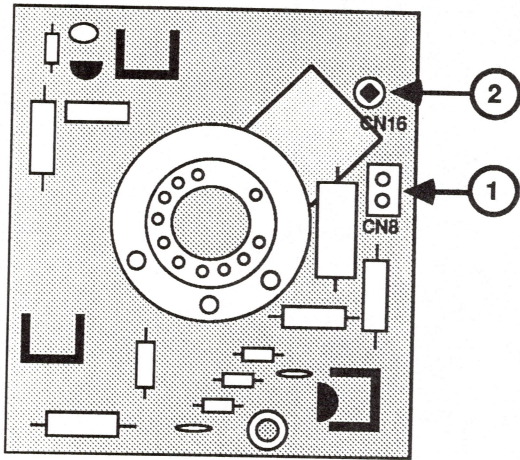


FIGURE 14

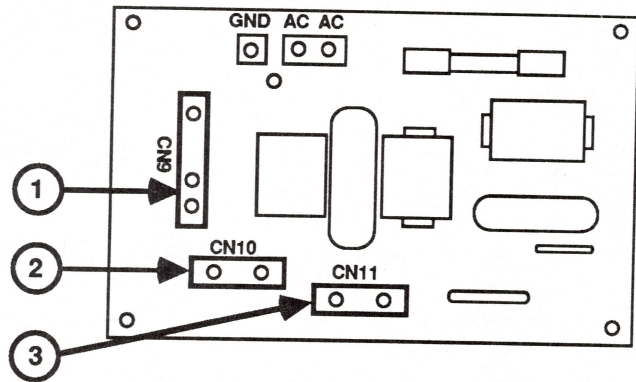


FIGURE 15

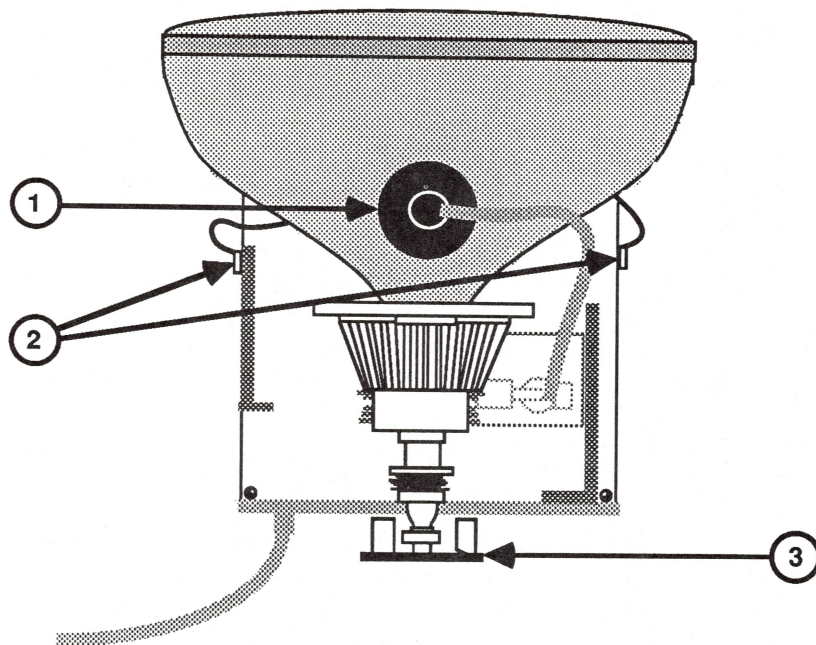


FIGURE 16

3. Turn the CRT socket board so that you can see the component side (Figure 14).
4. Connect the following connectors to the CRT socket board:
  - a) CN8 -- Figure 14, #1 (the connector with two wires that are soldered at their other end to the logic board).
  - b) Connect the remaining black single connector to CN16 on the CRT socket board (Figure 14, #2). This is the connector attached to the green CRT ground strap at the side of the monitor.

**CAUTION:** Be sure that all the connector wires are placed under the CRT neck.

5. Replace the CRT socket board (Figure 16, #3). It fits only one way.
6. Connect the following connectors to the power supply board:
  - a) CN9 (green, white, and black) -- Figure 15, #1
  - b) CN10 (white) -- Figure 15, #2
  - c) CN11 (red) -- Figure 15, #3
7. Replace the anode cap (Figure 16, #1).
8. Replace the screws (Figure 16, #2) to secure the CRT ground straps to both sides of the main chassis.
9. Slide the main logic PCB toward the front end of the monitor as far as it will go.
10. Support the main logic PCB with one hand as you tilt it until it is resting on its screen side.
11. Replace the four main screws used to secure the main logic PCB to the case. These screw holes are located between the bottom of the metal frame and the plastic case.
12. Replace the rear cover. (See "Replacing the Rear Cover.")



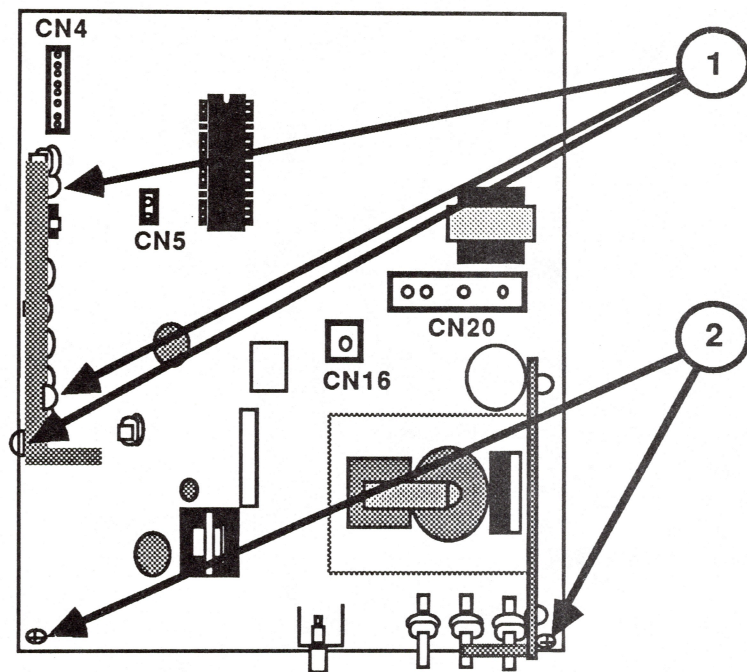


FIGURE 17

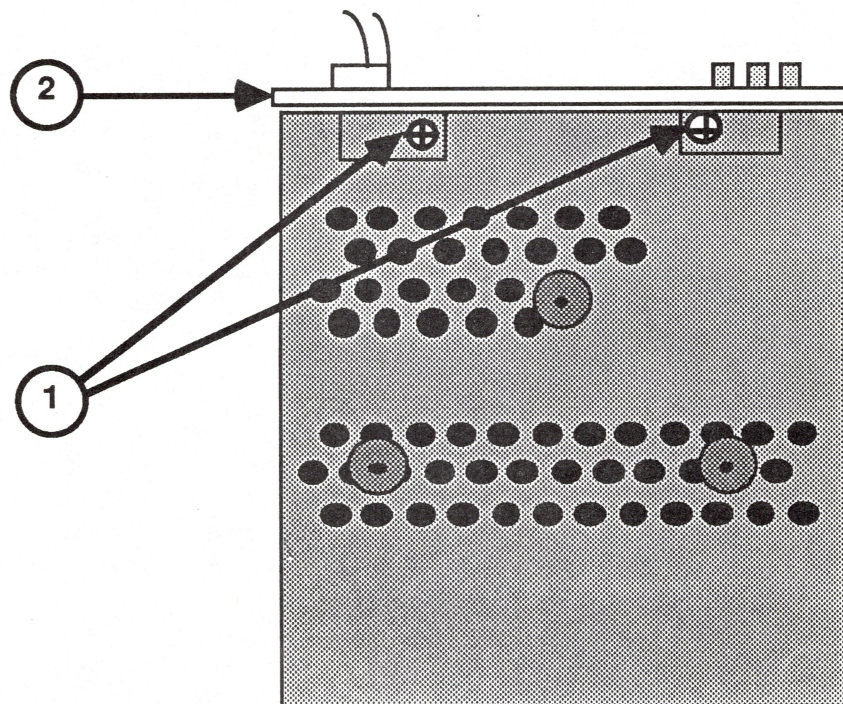


FIGURE 18



## **REMOVING THE POWER SUPPLY/PANEL/AC CORD ASSEMBLY - Series "S"**

1. Turn off the monitor and unplug the AC cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. Discharge the CRT. (See "Discharging the Cathode Ray Tube [CRT].")
4. Remove the main logic PCB. (See "Removing the Main Logic PCB.")
5. Remove the two mounting screws from the inside corners of the power supply board and the one remaining mounting screw on the outside corner (Figure 17, #1).
6. Remove the two screws (Figure 17, #2) from the rear corners of the main logic PCB.
7. Tip up the logic board frame so you can see the bottom.
8. Remove the two screws (Figure 18, #1) from the bottom of the metal frame.
9. Pull the rear panel (Figure 18, #2), along with the AC cord and power supply board, away from the monitor.

## **REPLACING THE POWER SUPPLY/PANEL/AC CORD ASSEMBLY - Series "S"**

1. Place the rear panel over the three controls at the back of the main logic PCB. The supports on the bottom edge of the plastic panel fit flush between the logic board and its metal chassis.
2. Replace the two screws (Figure 17, #2) at the rear corners of the main logic PCB.
3. Replace the two screws (Figure 18, #1) to secure the rear panel to the bottom of the metal chassis.
4. Replace the three mounting screws (Figure 17, #1) which secure the power supply board bracket to the logic board frame.
5. Replace the main logic PCB. (See "Replacing the Main Logic PCB.")
6. Replace the rear cover. (See "Replacing the Rear Cover.")



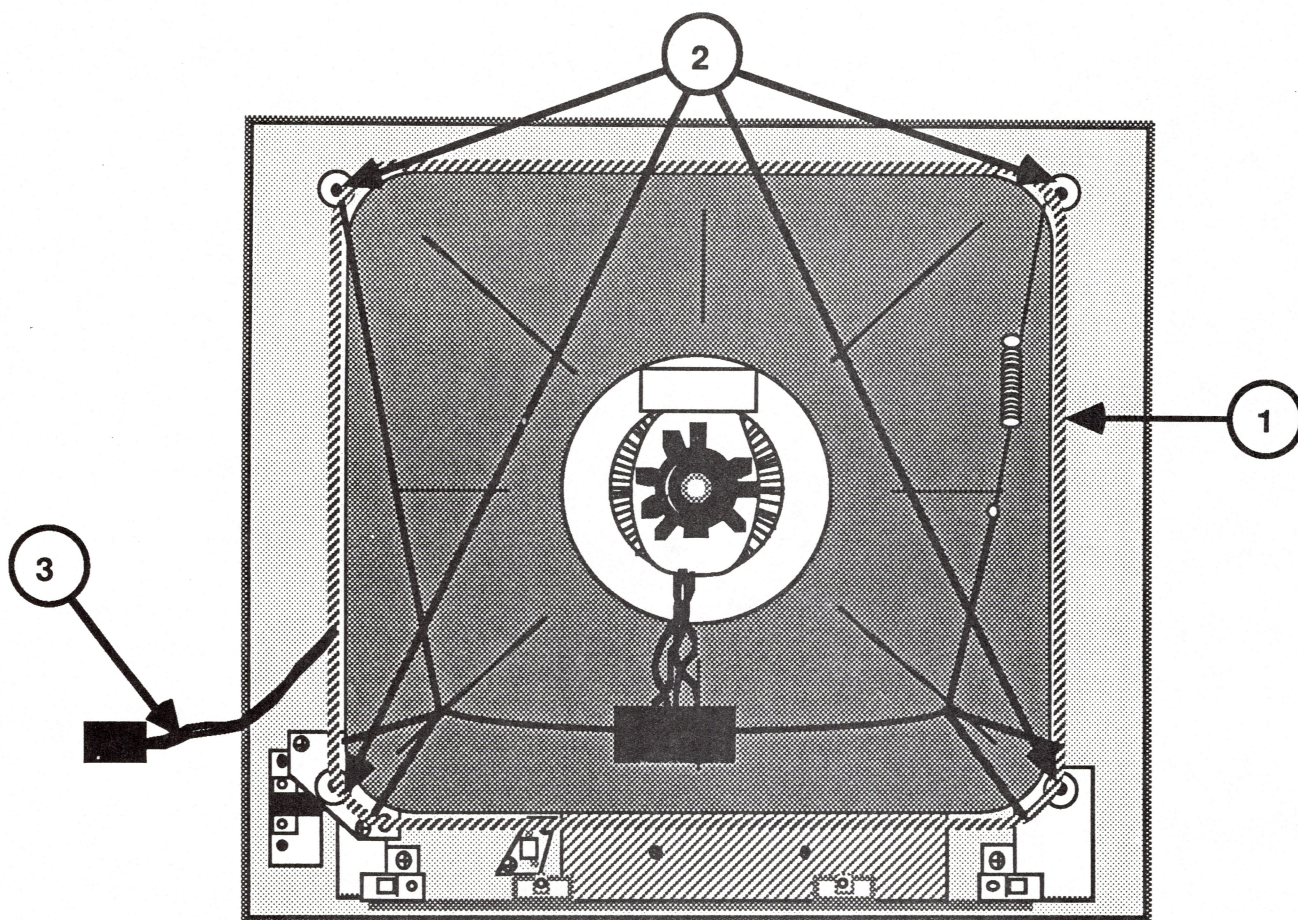


FIGURE 19



## **REMOVING THE CATHODE RAY TUBE [CRT] - Series "S"**

1. Turn off the monitor and disconnect the AC cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube [CRT].")
4. Remove the main logic PCB. (See "Removing the Main Logic PCB.")
5. Place the monitor face down on a protective pad.
6. Locate the degaussing coil (Figure 19, #1). It is braced to the CRT by plastic coated holding tabs at each corner.
7. Bend the tabs out to free the degaussing coil. Lift the coil away from the CRT.
8. Remove the four CRT mounting screws (Figure 19, #2), the washers, and holding tabs.
9. Carefully lift the CRT off the front bezel.

**WARNING: IF YOU INTEND TO DISPOSE OF THE CRT, REFER TO "Disposing of the Cathode Ray Tube" IN SECTION 1.**

## **REPLACING THE CATHODE RAY TUBE [CRT] - Series "S"**

1. Place the front bezel face down on a clean, soft surface.
2. Carefully set the CRT inside the bezel (see Figure 19).
3. Replace the holding tabs, washers, and CRT mounting screws (Figure 19, #2).
4. Place the degaussing coil over the CRT so that the connector (Figure 19, #3) is at your left (when facing the back of the monitor).
5. Bend the holding tab stems around the degaussing coil to secure the coil to the CRT.
6. Replace the main logic PCB. (See "Replacing the Main Logic PCB.")
7. Replace the rear cover. (See "Replacing the Rear Cover.")

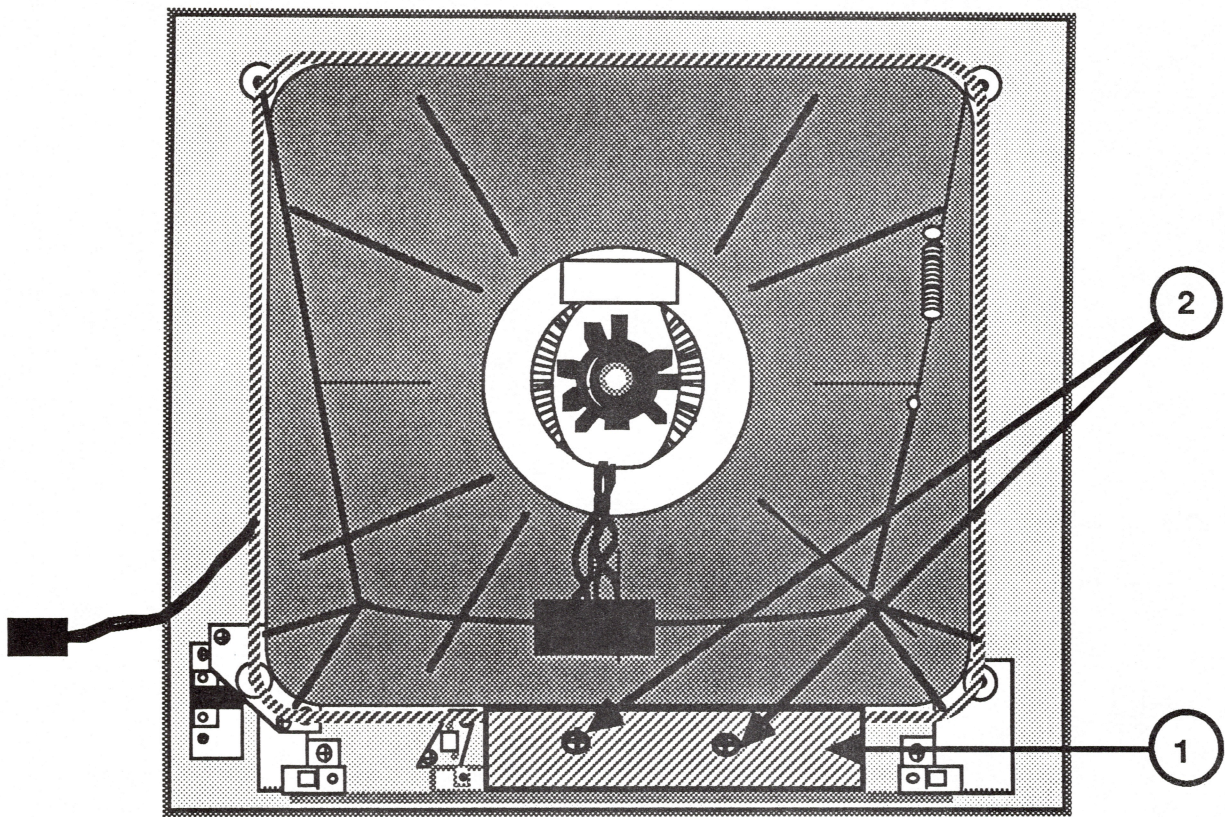


FIGURE 20



## **REMOVING THE CONTROL PCB - Series "S"**

1. Turn off the monitor and disconnect the AC cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube [CRT].")
4. Remove the main logic PCB. (See "Removing the Main Logic PCB.")
5. Place the monitor face down.
6. Locate the control PCB (Figure 20, #1).
7. Remove the two mounting screws (Figure 20, #2).
8. Lift the control PCB just high enough to turn it over and disconnect the power LED (CN15) from the component side. (This connector must be detached before you can completely remove the control PCB.)
9. Remove the four plastic control knobs and retain them to use on the replacement control PCB.

## **REPLACING THE CONTROL PCB - Series "S"**

1. Install the customer's four plastic control knobs on the replacement control PCB.
2. Connect the power LED (CN15) to the control PCB. There is only one way it will fit.
3. Set the control PCB into the bezel so that the control knobs protrude through the holes on the front panel (they only fit one way). The control PCB connector should extend to the left as you face the back of the monitor.
4. Replace the two control PCB mounting screws (Figure 20, #2).
5. Replace the main logic PCB. (See "Replacing the Main Logic PCB.")
6. Replace the rear cover. (See "Replacing the Rear Cover.")

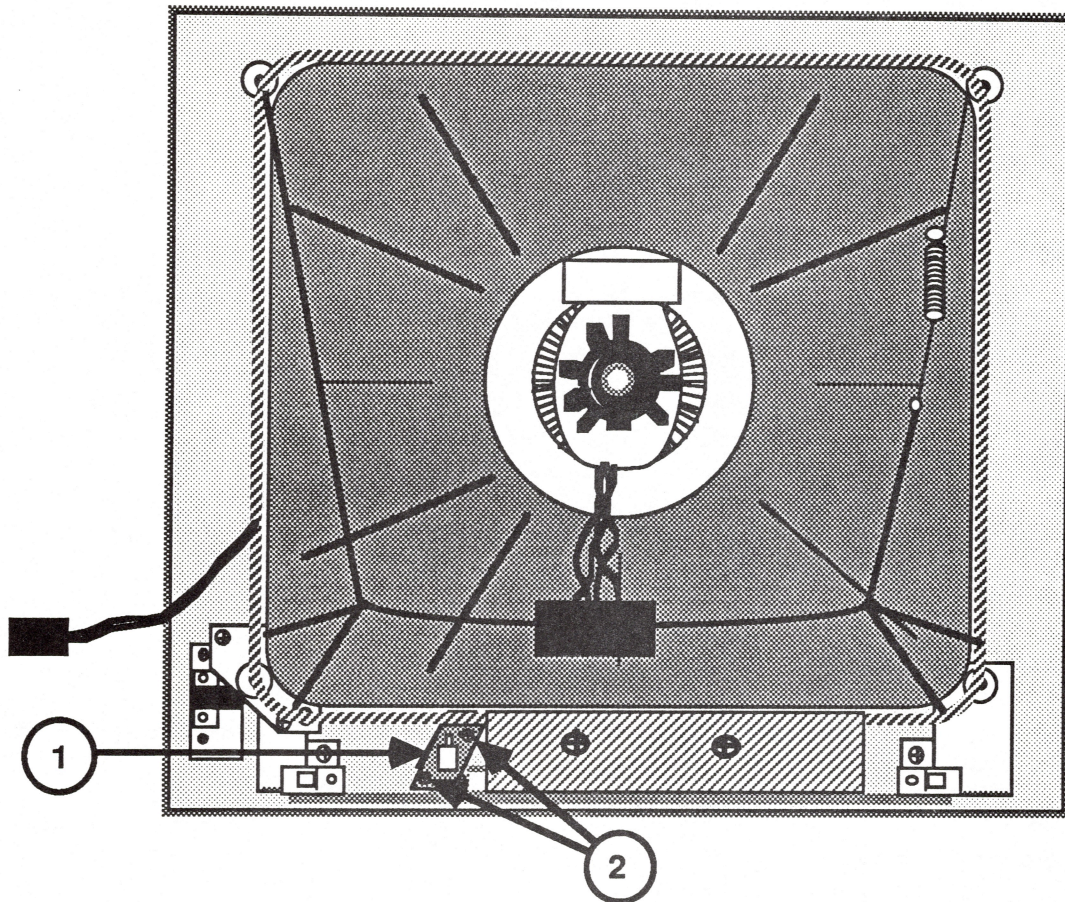


FIGURE 21



### REMOVING THE WHITE ONLY SWITCH - Series "S"

1. Turn off the monitor and disconnect the AC power cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube [CRT].")
4. Remove the main logic PCB. (See "Removing the Main Logic PCB.")
5. Locate the White Only switch (Figure 21, #1).
6. Remove the two screws (Figure 21, #2) that secure the switch plate to the front bezel.
7. Lift the switch out.
8. Remove the plastic knob from the switch and retain it to use on the replacement switch.

**CAUTION:** Be especially careful when removing this knob. The knob mounting is flexible and can easily be broken, requiring replacement of the whole switch. Use the fingers of one hand to hold the mounting down **very securely** while you pull the knob off its shank.

### REPLACING THE WHITE ONLY SWITCH - Series "S"

1. Install the customer's plastic knob over the switch shank.
2. Set the switch into the front bezel so that the plastic post protrudes through the hole in the switch plate (Figure 21, #1).
3. Replace the two mounting screws (Figure 21, #2).
4. Replace the main logic PCB. (See "Replacing the Main Logic PCB.")
5. Replace the rear cover. (See "Replacing the Rear Cover.")

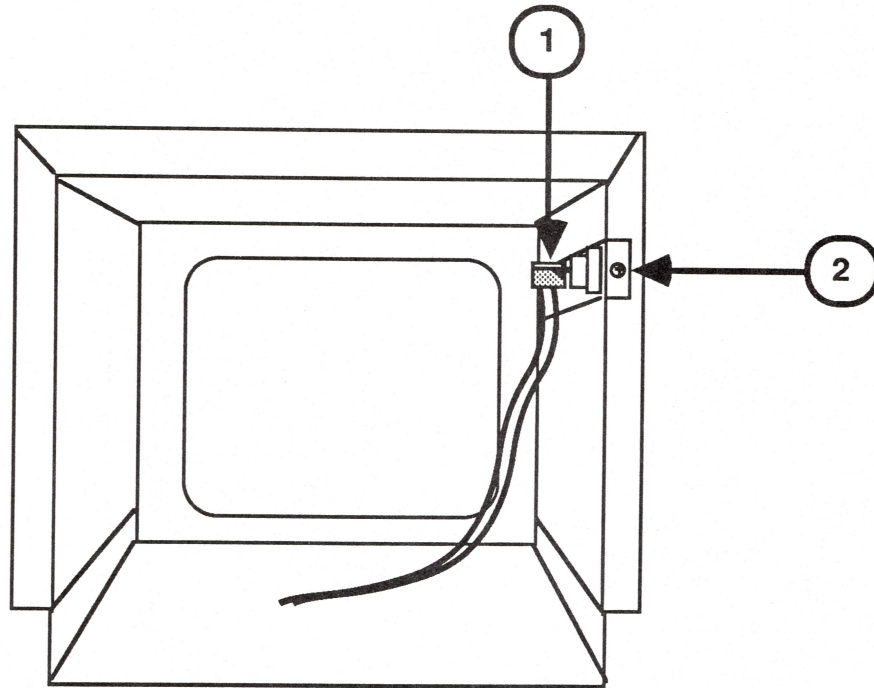


FIGURE 22

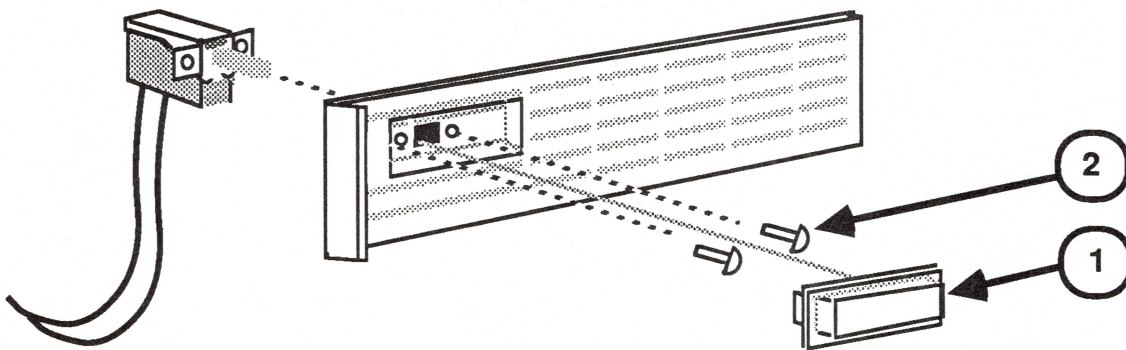


FIGURE 23



### REMOVING THE ON/OFF SWITCH (IIC ColorMonitor only) - Series "S"

1. Turn off the monitor and disconnect the AC cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube [CRT].")
4. Locate the on/off switch (Figure 22, #1) inside the rear cover. It is mounted on a plastic bracket which is attached to the side of the rear cover.

**CAUTION:** MAKE SURE THE ON/OFF SWITCH IS DISCONNECTED FROM THE POWER SUPPLY BOARD.

5. Remove the screw (Figure 22, #2) which secures the plastic bracket to the rear cover.
6. Pull the switch button (Figure 23, #1) off its shaft.
7. Remove the two screws (Figure 23, #2) which secure the on/off switch to the plastic bracket.

### REPLACING THE ON/OFF SWITCH - Series "S"

1. Replace the two mounting screws (Figure 23, #2) to secure the on/off switch to its bracket.
2. Snap the switch button (Figure 23, #1) onto the switch shaft.
3. Replace the screw (Figure 22, #2) that secures the bracket to the inside of the rear cover.
4. Replace the rear cover. (See "Replacing the Rear Cover.")



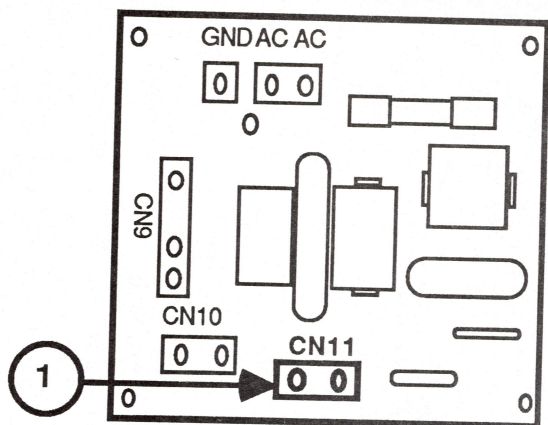


FIGURE 24

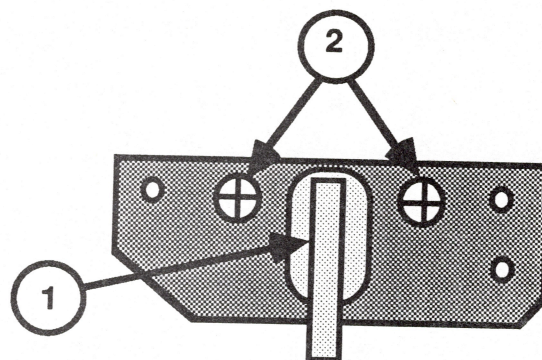


FIGURE 25

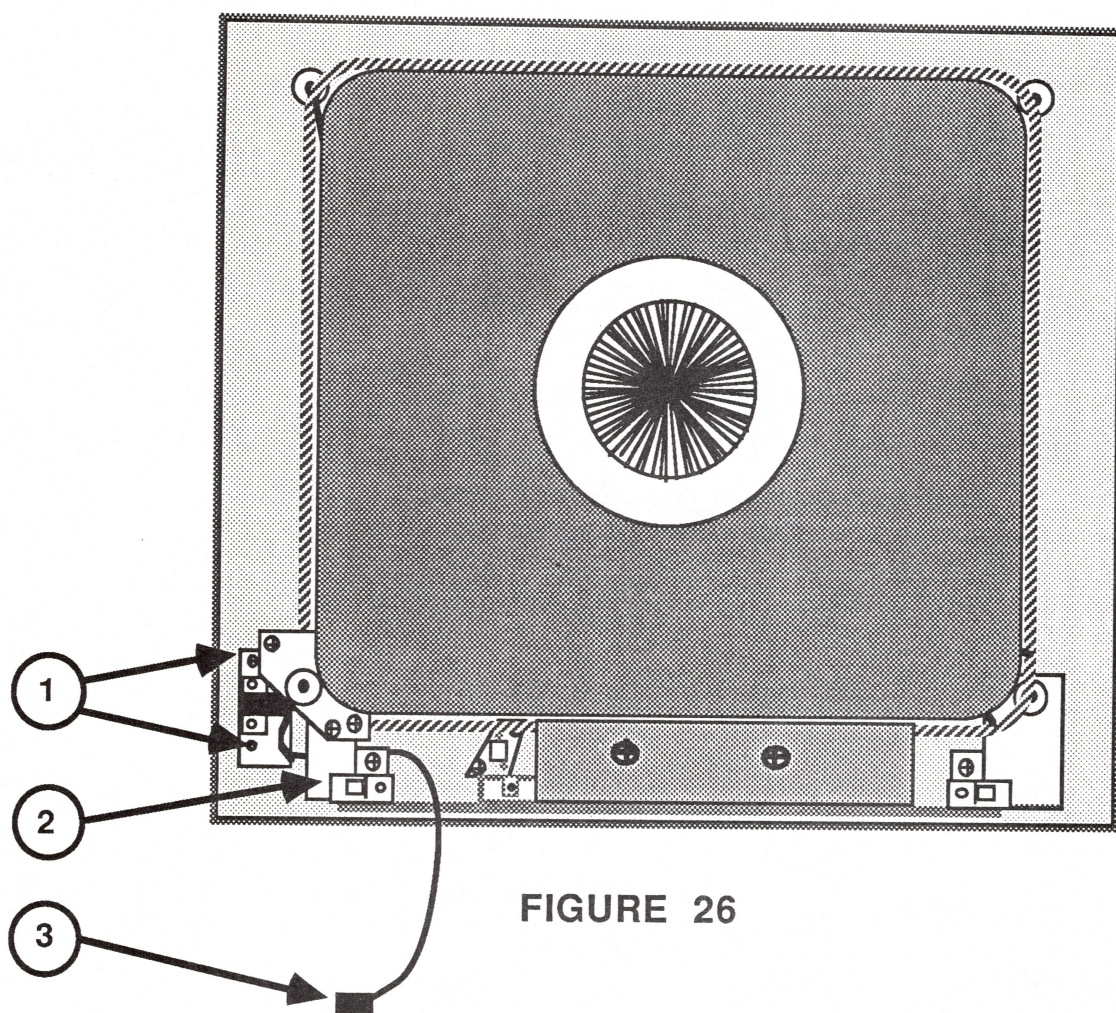


FIGURE 26



### **REMOVING THE ON/OFF SWITCH (IIE ColorMonitor only) - Series "S"**

1. Turn off the monitor and disconnect the AC cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube [CRT]".)
4. Disconnect the on/off switch connector (CN11) from the power supply board. (Figure 24, #1.)
5. Remove the two screws (Figure 26, #1) which secure the metal switch bracket to the bezel.
5. Lift the switch out, jiggling to free the plastic switch button from the bezel.
6. Pull the plastic switch button (Figure 25, #1) off the switch assembly.
7. Remove the two screws (Figure 25, #2) which secure the on/off switch to the metal bracket.

### **REPLACING THE ON/OFF SWITCH (for IIE only) - Series "S"**

1. Replace the plastic switch button over the switch shaft.
2. Replace the two screws (Figure 25, #2) to secure the on/off switch to the metal bracket.
3. Slide the switch connector under the CRT mounting bracket (Figure 26, #2) and pull the wire through until the switch meets its slot in the front bezel.
4. Replace the two screws (Figure 26, #1) to secure the switch to the front bezel.
5. Connect the switch connector (CN11) (Figure 26, #3) to the power supply board (Figure 24, #1).
6. Replace the rear cover. (See "Replacing the Rear Cover.")

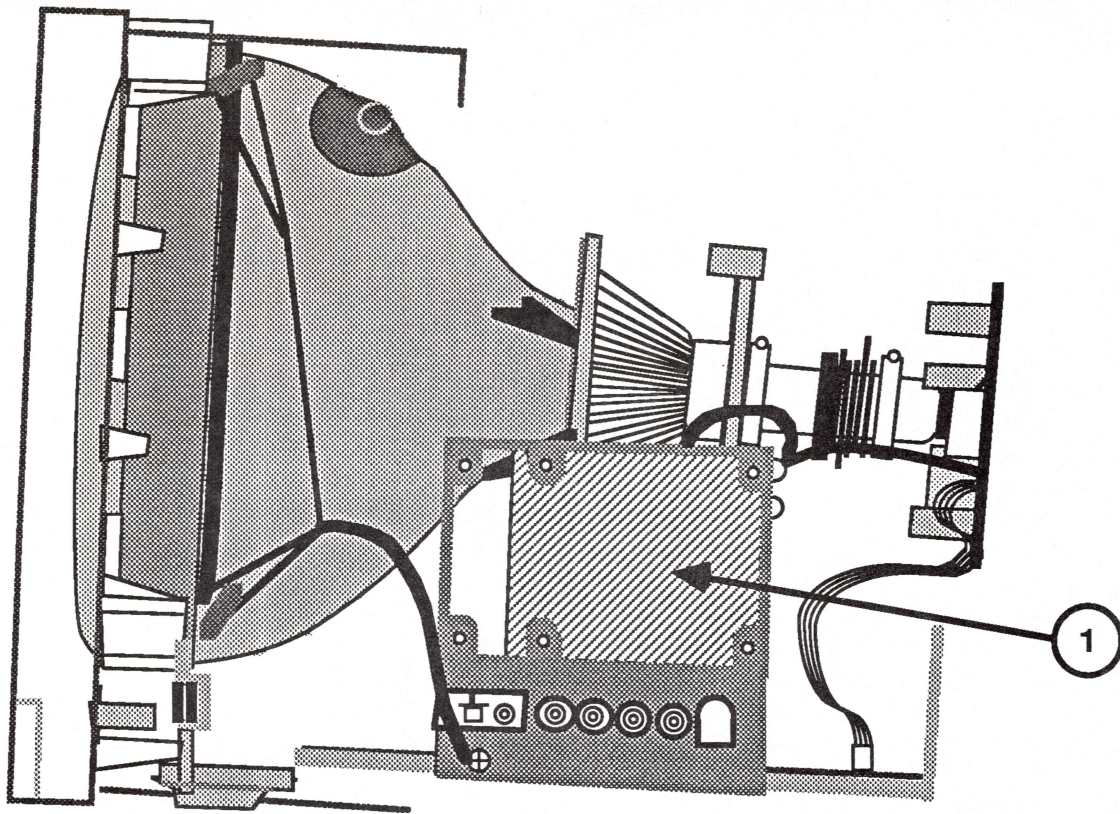


FIGURE 27

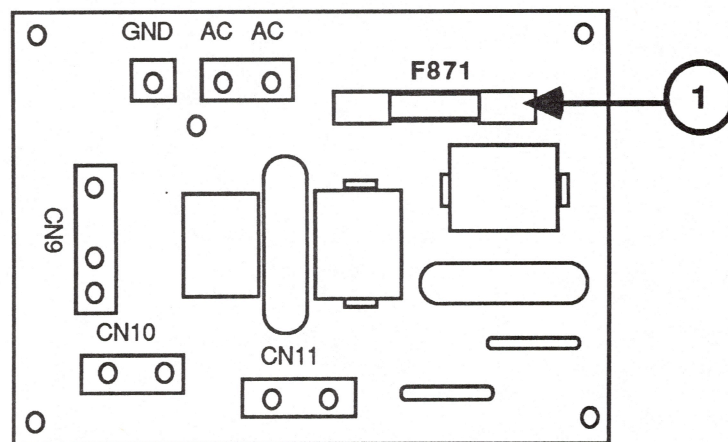


FIGURE 28



## REPLACING THE POWER SUPPLY FUSE (F871) - Series "S"

The power supply fuse is mounted on the component side of the power supply board (Figure 27, #1). You do not have to remove the board in order to replace the fuse.

**NOTE:** Fuse F871 should be replaced with a 250V 3A Slow Blow fuse.

1. Disconnect the AC power cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube [CRT].")
4. Locate fuse F871 (Figure 28, #1).
5. Carefully pry at one metal end, then the other, to remove the fuse from the fuse holder.

**CAUTION: DO NOT TRY TO SLIDE THE FUSE SIDEWAYS. YOU MAY BREAK THE FUSE HOLDER.**

6. Snap in the 250V 3A Slow Blow fuse.
7. Replace the rear cover. (See "Replacing the Rear Cover.")

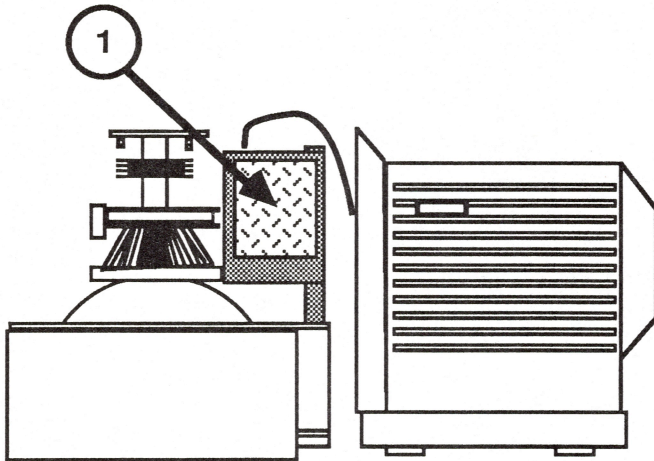


FIGURE 29

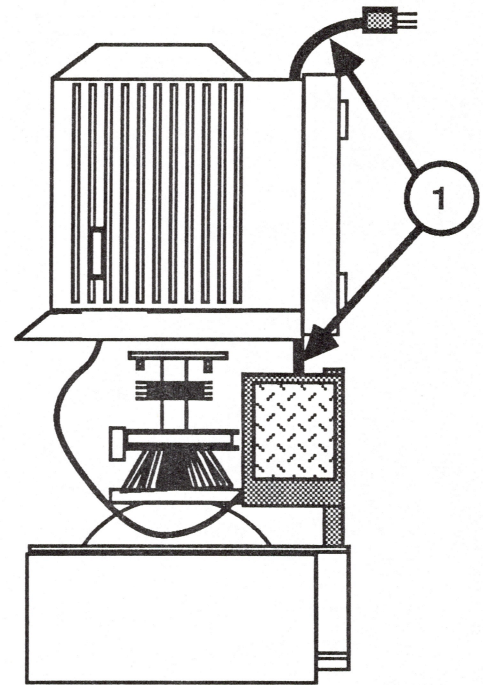


FIGURE 30

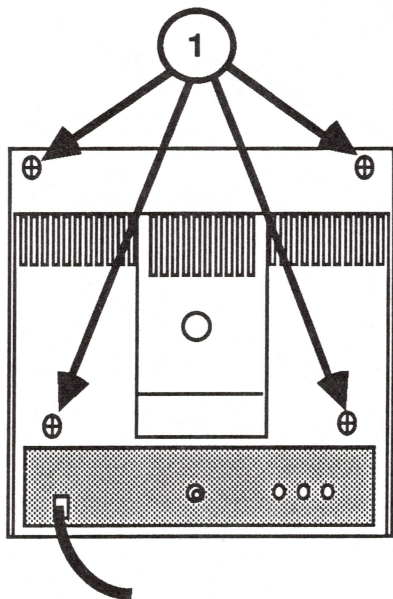


FIGURE 31

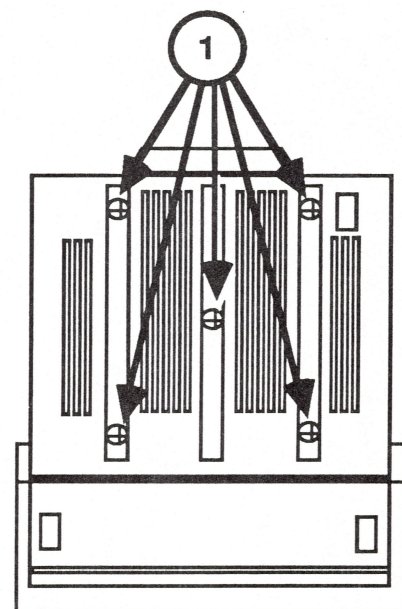


FIGURE 32



## REPLACING THE REAR COVER (IIc ColorMonitor only) - Series "S"

1. Orient the rear cover and monitor as shown in Figure 29; the monitor is face down and the rear cover is upright.
2. Connect the power switch cable (from inside the rear cover) to CN11 on the power supply board (Figure 29, #1).

**NOTE:** The connectors (CN) are labeled on the both sides of the power supply board.

3. Feed the AC power cord through the opening in the rear cover while you lower the cover onto the monitor (Figure 30, #1).
4. Replace the four screws (Figure 31, #1) at the back of the monitor.
5. Replace the five screws (Figure 32, #1) at the bottom of the monitor.

**NOTE:** If the monitor came with antistatic rubber grommets covering the five bottom case screws, replace them by pushing them firmly over the screw heads.

6. Set the monitor back on its feet.
7. Run the monitor tests on the Apple II Peripherals Diskette (or equivalent) to verify that the monitor is functioning properly. Equivalent diagnostics are those that generate color bars or test patterns and can thus verify the monitor's color operation.

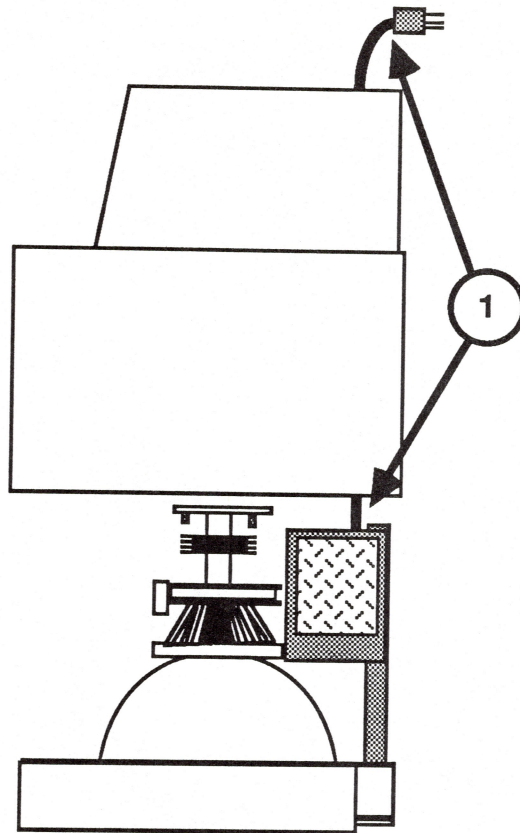


FIGURE 33

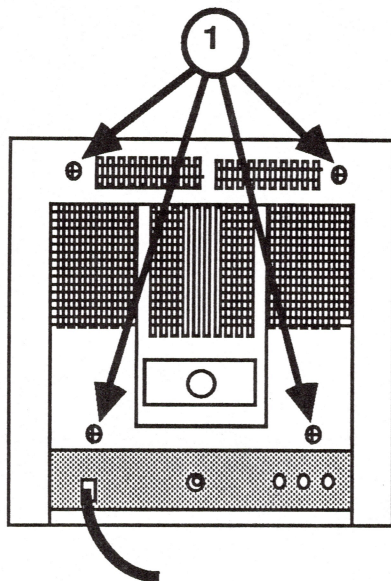


FIGURE 34

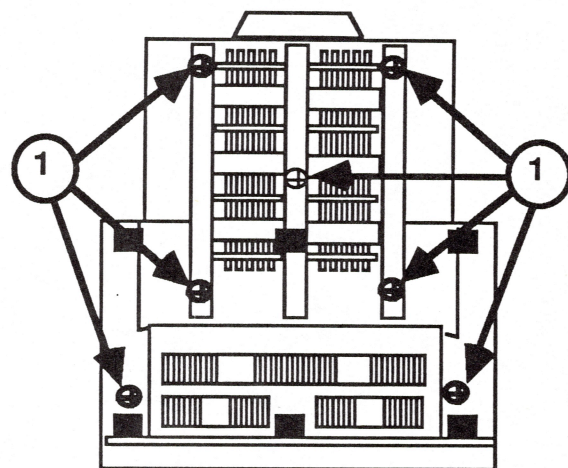


FIGURE 35



## REPLACING THE REAR COVER (IIe ColorMonitor only) - Series "S"

1. Feed the AC power cord through the opening in the cover while you lower the cover onto the monitor (Figure 33, #1).
2. Replace the four screws (Figure 34, #1) at the back of the monitor.
3. Replace the seven screws (Figure 35, #1) at the bottom of the monitor.
4. Run the monitor tests on the Apple II Peripherals Diskette (or equivalent) to verify that the monitor is functioning properly. Equivalent diagnostics are those that generate color bars or test patterns and can thus verify the monitor's color operation.

# Apple ColorMonitor IIc/IIe Technical Procedures

## Section 3

### Take-Apart

#### Series "H"

#### Contents:

Removing the Rear Cover (for IIc).....	3H.3
Removing the Rear Cover (for IIe).....	3H.5
Discharging the Cathode Ray Tube (CRT).....	3H.7
Removing and Replacing Procedures:	
Main Logic PCB.....	3H.9
Cathode Ray Tube (CRT).....	3H.21
LED Assembly (for IIc).....	3H.25
LED Assembly (for IIe).....	3H.27
Logic Board Fuses (F901 and F902).....	3H.29
Replacing the Rear Cover (for IIc).....	3H.31
Replacing the Rear Cover (for IIe).....	3H.33
Rev. B Logic Board Replacement (Temporary Procedure)*	
Introduction.....	3H.35
Removing the Main Logic Board Assembly.....	3H.37
Removing the AC Power Cord and Back Panel.....	3H.37
Preparing the Rev. A Logic Board Service Module.....	3H.39
Installing the Rev. B Rear Panel and Power Cord on the Rev. A Main Logic Board Service Module....	3H.41
Installing the Prepared Rev. A Main Logic Board Module in the Rev. B Chassis.....	3H.42
Rev. A Logic Board Replacement (Temporary Procedure)*	
Insert here purged pages 3H.7-20 (Nov 85).	

\* These two temporary procedures are to be used only as long as you have unreworkeed Rev. A logic board service modules in stock. After that time, they may be purged.

**NOTE:** For Series "S" Take-Apart, see the preceding section, beginning on page 3S.1.



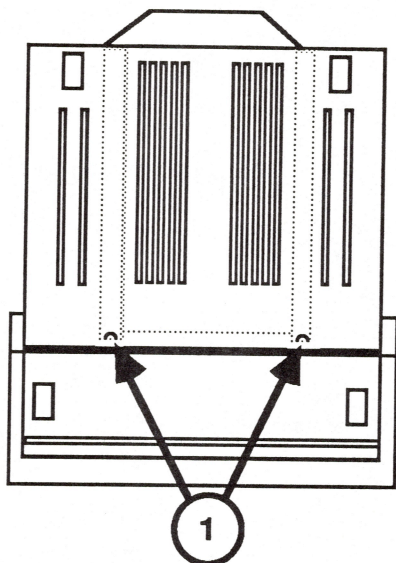


FIGURE 1

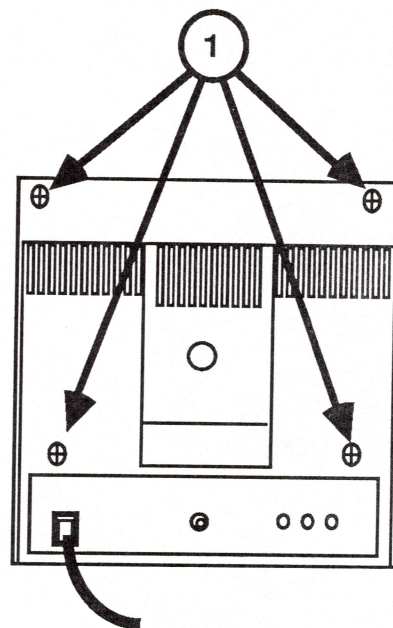


FIGURE 2

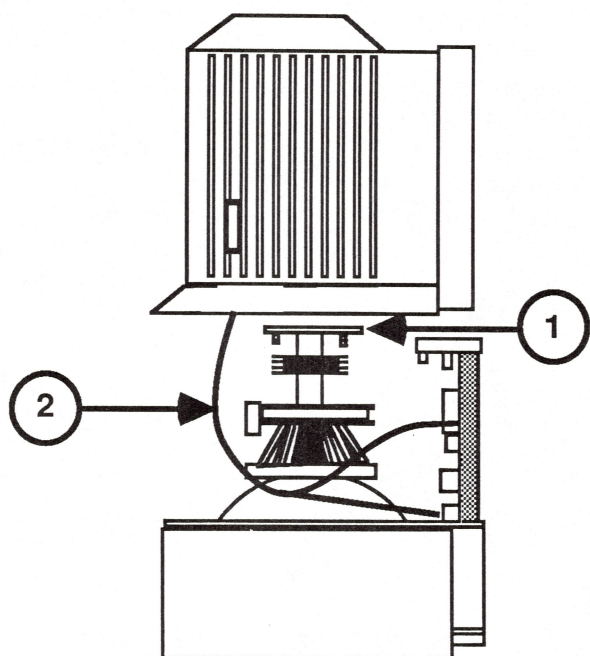


FIGURE 3

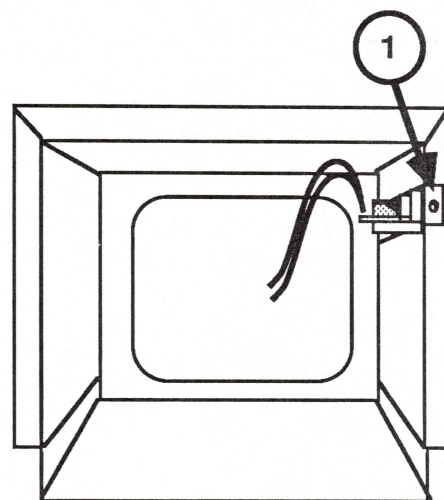


FIGURE 4

## REMOVING THE REAR COVER (IIc ColorMonitor only) - Series "H"

1. Turn the monitor off and disconnect the power cord.
2. Disconnect the video cable from the back of the monitor.
3. Carefully set the monitor on its face (screen side) so that the back is facing up. (**NOTE:** The ColorMonitor contains sensitive components that can be damaged by rough treatment. Whenever it is necessary to turn the monitor over, be sure to rest it on a protective pad.)
4. Remove the two screws (Figure 1, #1) from the bottom of the monitor.
5. Remove the four screws (Figure 2, #1) from the back of the monitor.
6. Carefully pull the rear cover up until it clears the CRT socket board (Figure 3, #1) at the end of the CRT neck.  
  
**CAUTION:** Because the power (on/off) switch is attached to the rear cover, the power switch cable (Figure 3, #2) will prevent you from removing the cover completely until the on/off switch bracket is disconnected from the rear cover, as directed in Step 9 below.
7. Set the rear cover next to the monitor.
8. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube.")
9. Locate the on/off switch inside the rear cover (see Figure 4). It is mounted on a plastic bracket which is attached to the side of the rear cover.
10. Remove the screw (Figure 4, #1) which secures the plastic bracket to the rear cover.
11. Pull the AC power cord through the opening in the rear cover. Set the rear cover aside. Set the monitor on its feet.



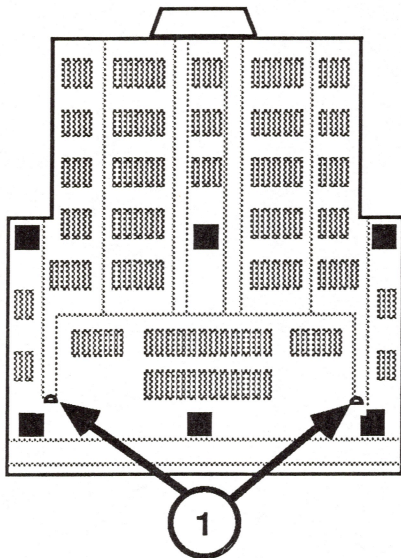


FIGURE 5

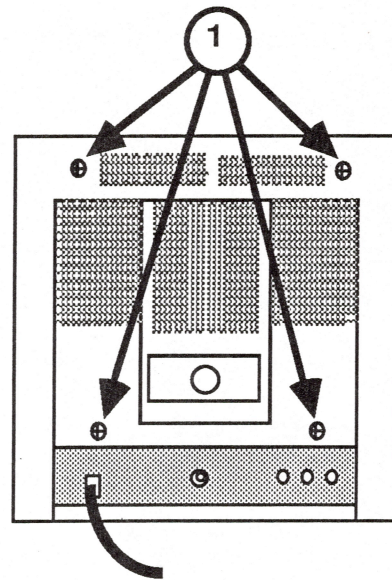


FIGURE 6

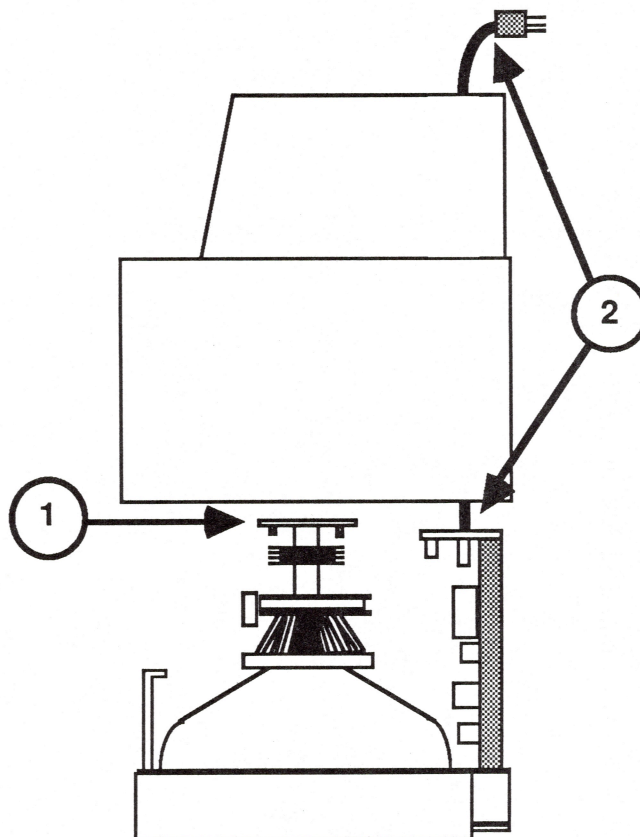


FIGURE 7

#### REMOVING THE REAR COVER (IIf ColorMonitor only) - Series "H"

1. Turn the monitor off and disconnect the AC cord.
2. Disconnect the video cable from the back of the monitor.
3. Carefully set the monitor on its face on a protective pad.
4. Remove the two screws (Figure 5, #1) from the bottom of the monitor.
5. Remove the four screws (Figure 6, #1) from the back of the monitor.
6. Carefully pull the rear cover up until it clears the CRT socket board (Figure 7, #1).
7. Pull the AC power cord (Figure 7, #2) through the opening in the rear cover.
8. Set the rear cover aside. Set the monitor on its feet.



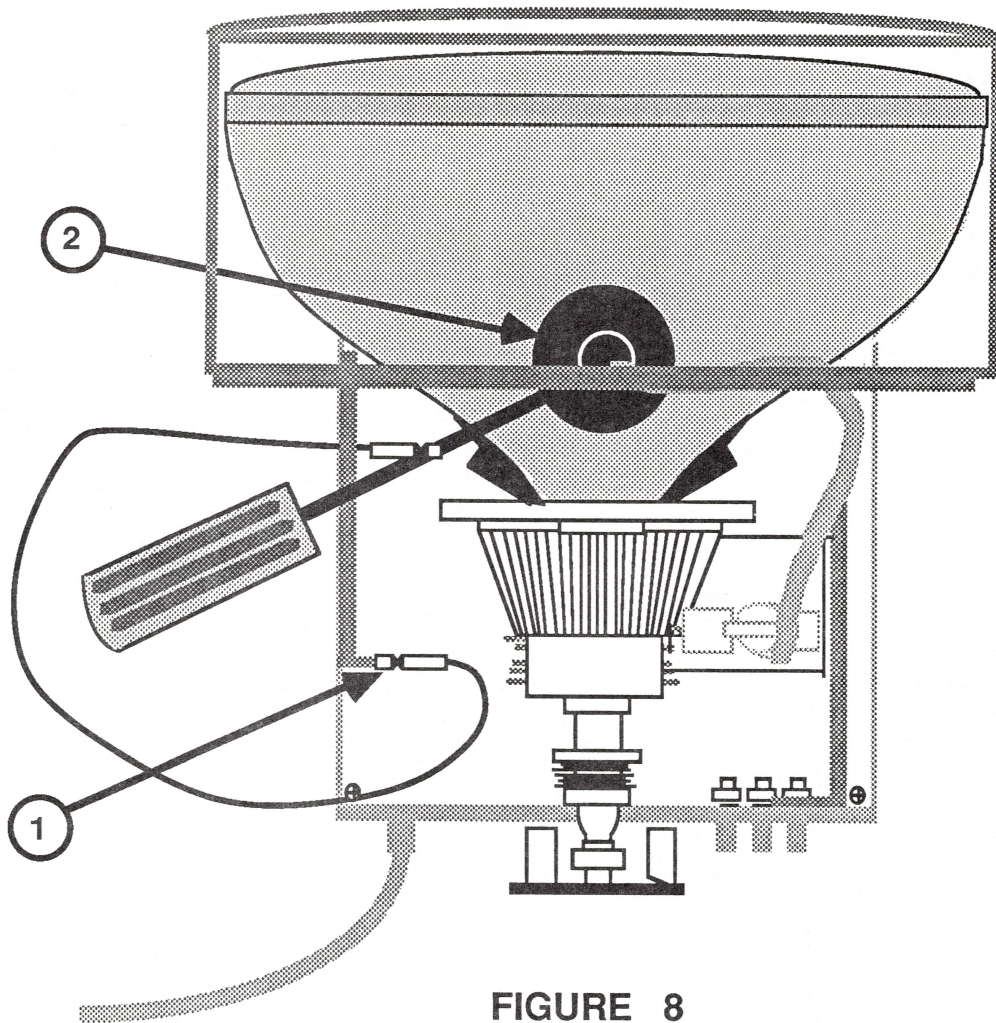


FIGURE 8

## DISCHARGING THE CATHODE RAY TUBE (CRT) - Series "H"

1. Turn off the monitor and disconnect the AC power cord.
2. Remove the rear cover. ("See Removing the Rear Cover.")
3. Set the monitor upright, with the back facing you.
4. Remove any metal jewelry (rings, watches, bracelets, hanging necklaces, etc.) and grounding wriststraps.
5. Put on safety goggles.
6. Attach one end of an alligator lead to a long flatblade screwdriver, two inches from the insulated handle. Attach the other end to any part of the metal bracket surrounding the power supply board. (Figure 8, #1.)

**WARNING: USE ONLY ONE HAND WHILE DISCHARGING THE CRT.** This is to eliminate any chance of your becoming a path for current should your hand slip and touch the metal part of the screwdriver. Grasp only the insulated handle of the screwdriver while discharging the CRT.

7. Slide the screwdriver under the CRT anode cap (Figure 8, #2) and push it towards the center of the cap until the blade contacts the metal anode ring.

**CAUTION: DO NOT USE FORCE.** If it is difficult to get the screwdriver under the anode cap, use a smaller screwdriver to loosen the suction of the anode cap on the tube. Discharge the anode by holding the large screwdriver against the anode ring for five seconds.

8. Remove the screwdriver and disconnect it from the alligator clip.
9. Peel back the anode cap until you can see the anode ring at the center. Look at the metal connector in the center of the cap and notice how it is clipped into the CRT. Push on the cap in one direction, freeing the metal connector from the CRT, and lift the cap off the tube.

**NOTE:** A secondary charge can build up even after you have discharged the CRT. To ensure that any residual charge is dissipated during the service procedure, establish a ground lead by fastening one alligator clip to the metal chassis and the other clip to the edge of the anode aperture.



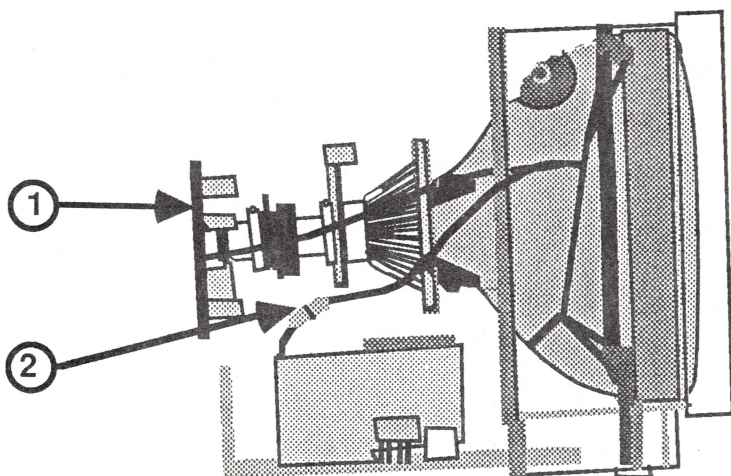


FIGURE 9

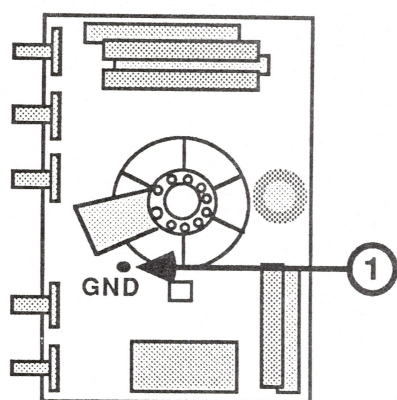


FIGURE 10

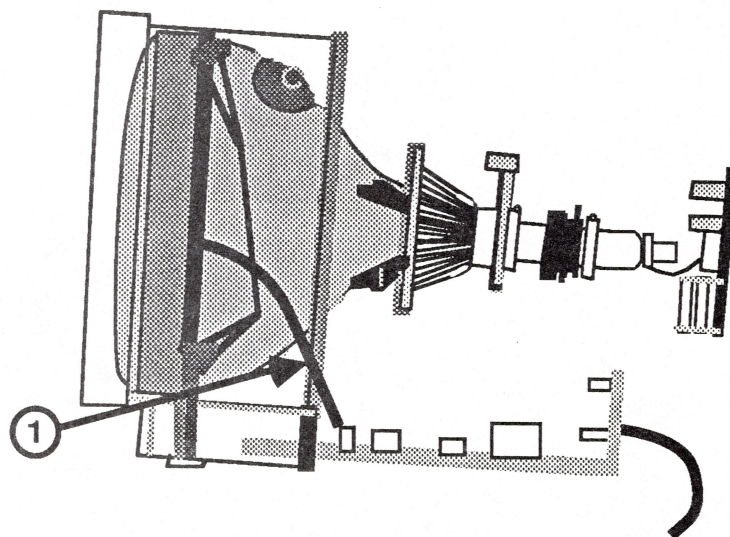


FIGURE 11

### REMOVING THE MAIN LOGIC PCB - Series "H"

1. Turn off the monitor and unplug the AC cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube.")
4. Carefully pull the CRT socket board (Figure 9, #1) away from the CRT neck until it clears the neck base.
5. Turn the socket board so that you can see the component side, as shown in Figure 10.
6. Disconnect the gray CRT ground strap from its connection (Figure 10, #1) on the CRT socket board.
7. Disconnect the white CRT ground strap at its plug-in connector (Figure 9, #2).
8. Remove all wires from the plastic cable clamps.
9. Disconnect the degaussing coil ground strap (Figure 11, #1) from connector W on the main logic PCB.

CONTINUED ON NEXT PAGE



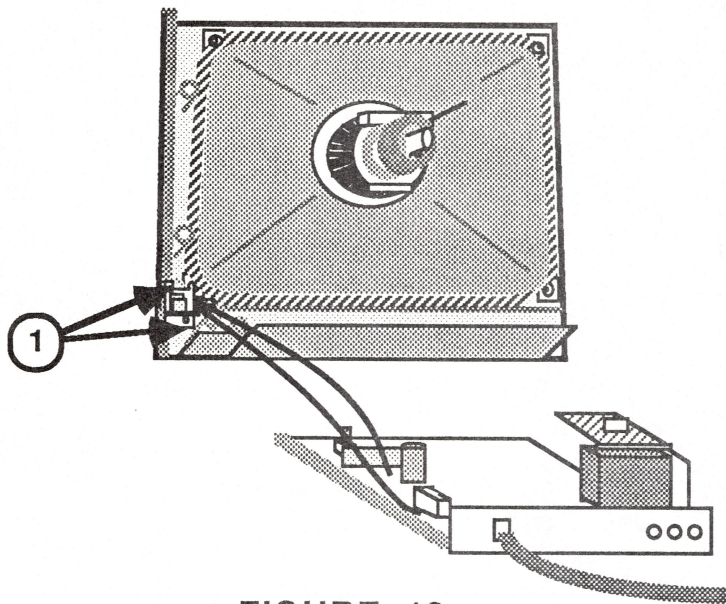


FIGURE 12

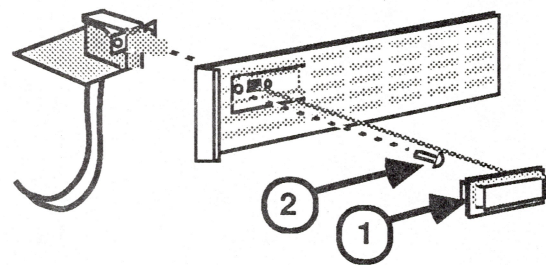


FIGURE 13

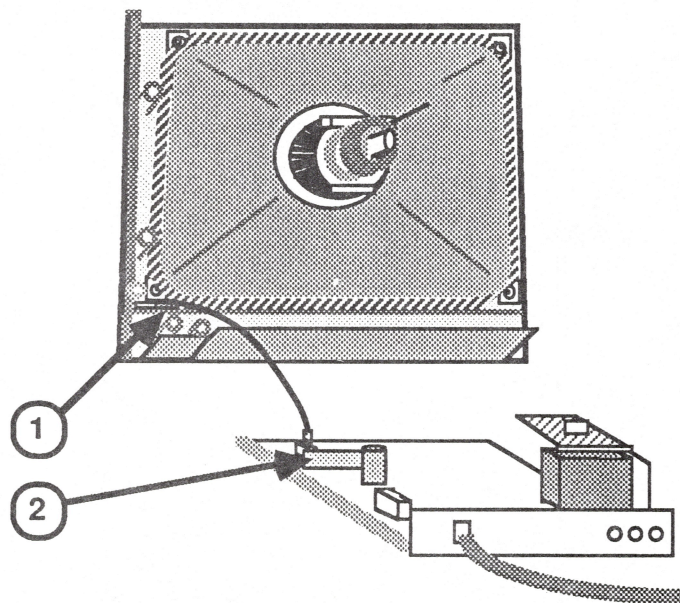


FIGURE 14

10. Disconnect the on/off switch from its bracket.

For the IIe:

- a. Remove the two screws\* that secure the on/off switch bracket to the front bezel (Figure 12, #1).
- b. Pull the switch button\* off its shaft.
- c. Remove the two screws\* securing the switch assembly to its mounting bracket.\*

For the IIc:

- a. Pull the switch button\* (Figure 13, #1) off its shaft.
- b. Remove the screw\* (Figure 13, #2) which secures the on/off switch to the plastic bracket.\*

11. For the IIe or IIc, Rev. A only:

Disconnect the LED cable (Figure 14, #1) from the small, vertically mounted video PCB attached to the main logic PCB (Figure 14, #2).

For the IIe or IIc, Rev. B only:

Disconnect the LED cable from the main logic PCB.

**NOTE:** Rev. B monitors may be identified by the absence of a separate power supply board.

- \* Save these items for installation on the replacement logic board module. (See **WHAT TO KEEP** and **WHAT TO RETURN** on the next page.)



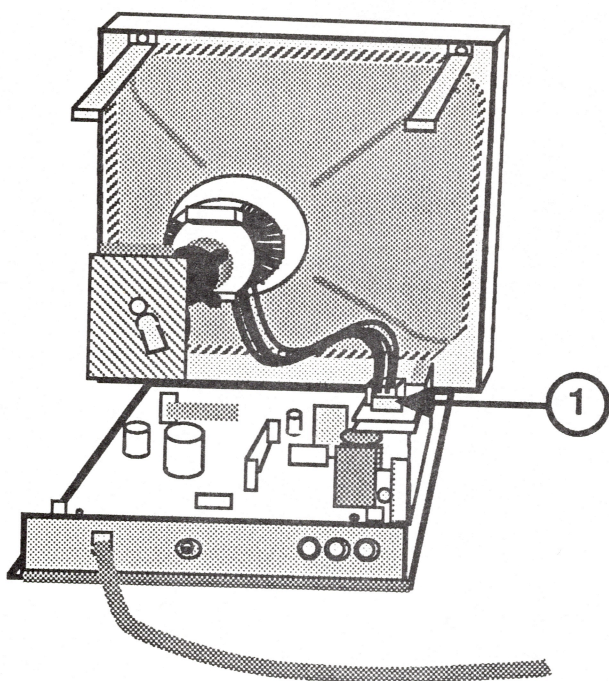


FIGURE 15

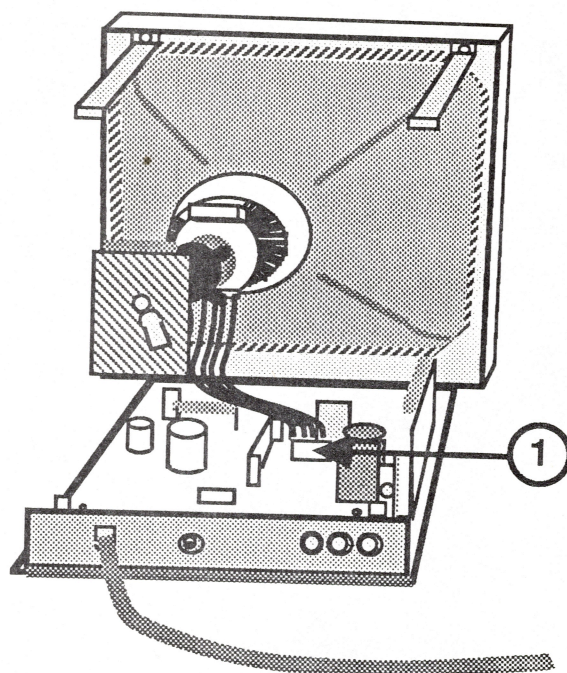


FIGURE 16

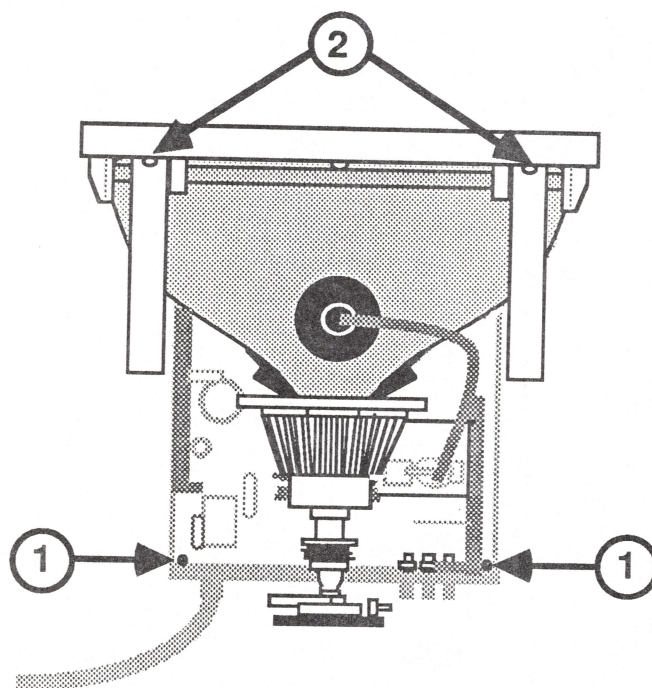


FIGURE 17



12. For the IIe or IIc, Rev. A only:  
Disconnect the CRT connector (red/blue/yellow/green) from the power supply board (Figure 15, #1).

For the IIe or IIc, Rev. B only:  
Disconnect the CRT connector (red/blue/yellow/green) from the logic board (Figure 16, #1).

13. Slide the main logic board assembly from under the CRT.  
14. Remove the five front plastic control knobs.\*

**CAUTION:** Be very careful with the fragile White Only switch (the elongated one). The mounting is easily broken, requiring replacement of the PCB. Use the fingers of one hand to hold the mounting down VERY SECURELY while you pull the switch button off its shank.

15. Remove the three rear control knobs\* as follows:  
a. Remove the two screws\* (Figure 17, #1) that secure the back panel to the main logic PCB.  
b. Carefully disengage the "teeth" on the bottom of the panel from the openings on the metal chassis.  
c. Taking care not to put tension on the AC power cord connection, move the right side of the rear panel away from the three plastic control knobs on the logic board.  
d. Remove the three rear plastic control knobs from the logic board.
16. For Rev. A only, remove the two screws\* holding the two upper case support brackets\* to the bezel (Figure 17, #2).

\* Check below to determine which model- or color-specific items to keep with the customer's unit and which should be sent back to Apple.

**WHAT TO KEEP:** Keep the following items to install on the replacement main logic board assembly:

1. Removable rear panel (Rev. B only - see Figure 19)
2. Control knobs (five front, three rear, one power)
3. IIe metal on/off switch bracket
4. IIc plastic on/off switch bracket
5. All screws

**WHAT TO RETURN:** The following items **MUST** be returned to Apple with the logic board:

1. Uninsulated IIe upper case support brackets (Rev. A only)
2. IIe extension bracket (located between the IIe main logic board and the control PCB)



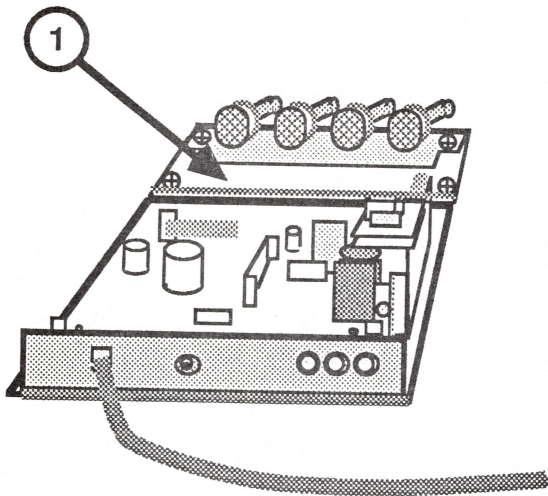


FIGURE 18

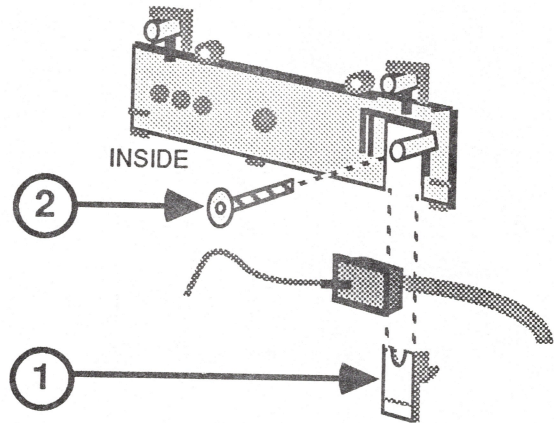


FIGURE 19

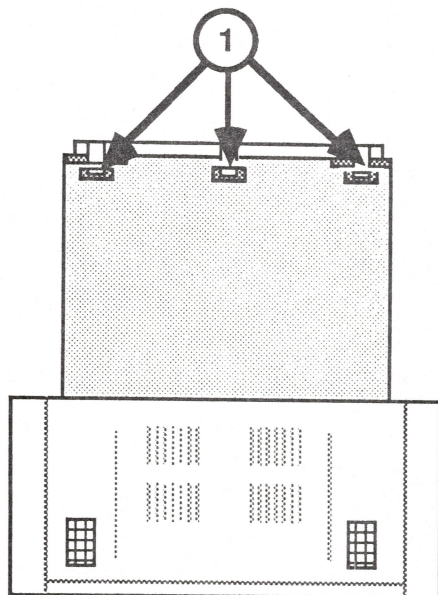


FIGURE 20

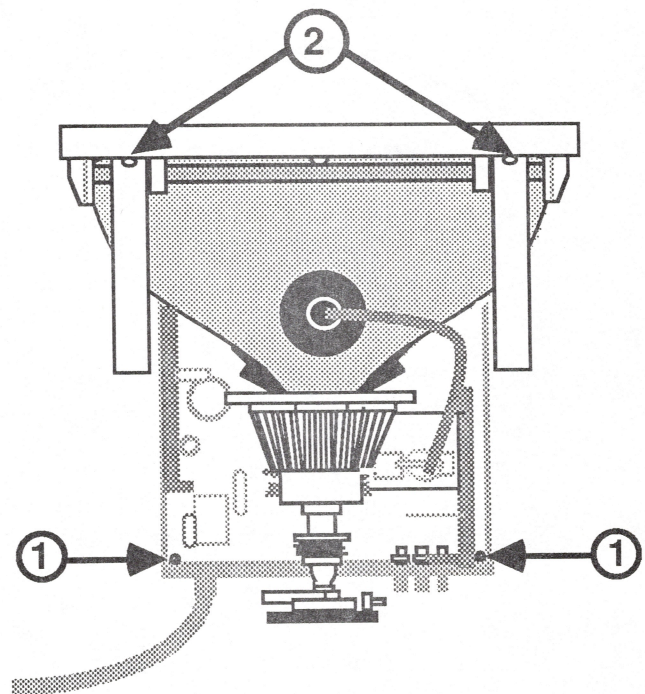


FIGURE 21

## REPLACING THE MAIN LOGIC PCB - Series "H"

**NOTE:** If you are installing a replacement main logic PCB module in the ColorMonitor IIe, you must first install an extension bracket between the main logic PCB and the control PCB. (This ensures size compatibility between the entire main logic PCB assembly and the monitor housing.) The extension bracket (with hardware) is included in all Main Logic Board Assembly spares modules. Install the bracket as shown in Figure 18, #1. Then continue to the steps below.

(If you are replacing the main Logic PCB of the ColorMonitor IIc, the bracket is not needed. Return it to Apple with the defective logic board assembly.)

1. Place the customer's three plastic control knobs over the adjustment pots at the back of the main logic PCB module.
2. From the logic board replacement kit, select the appropriately colored rear panel (to match the unit you are repairing) and fit the panel over the AC power cord (Figure 19). Slide the matching small plastic holding piece under the cord, as shown (Figure 19, #1) until it fits securely under the power cord.
3. Replace the screw that holds the power cord in place (Figure 19, #2).
4. Fit the rear panel over the three rear control knobs, making sure the plastic "teeth" on the bottom of the panel fit into the openings in the metal chassis (Figure 20, #1).
5. Replace the two screws (Figure 21, #1) that secure the back panel to the main logic PCB.
6. If you are repairing a Rev. A monitor, install the two new **INSULATED** upper case supports you will find in the logic board replacement kit. To do this, replace the two screws that secure the upper case supports to the top of the bezel (Figure 21, #2).

**WARNING: THESE INSULATED BRACKETS MUST BE INSTALLED WHENEVER YOU PLACE A REV. B LOGIC BOARD SERVICE MODULE IN A REV. A MONITOR CHASSIS. FAILURE TO DO SO CAN RESULT IN A POSSIBLE ELECTROSHOCK HAZARD FOR THE USER.**



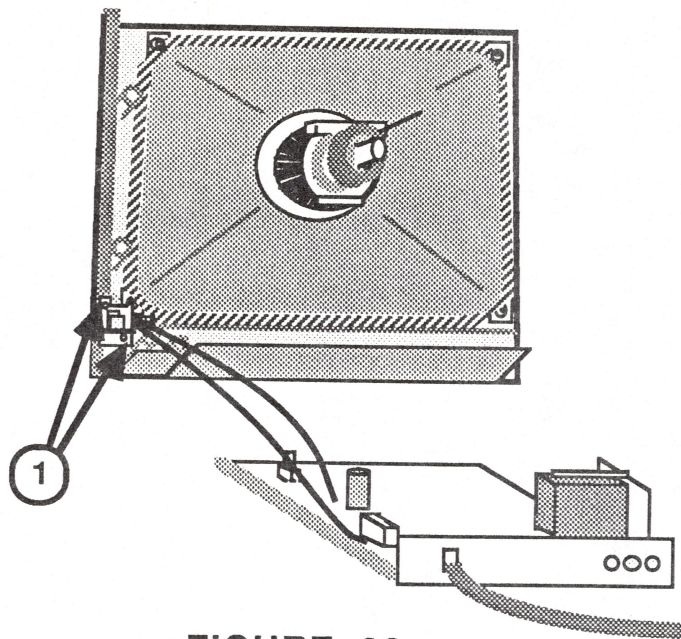


FIGURE 22

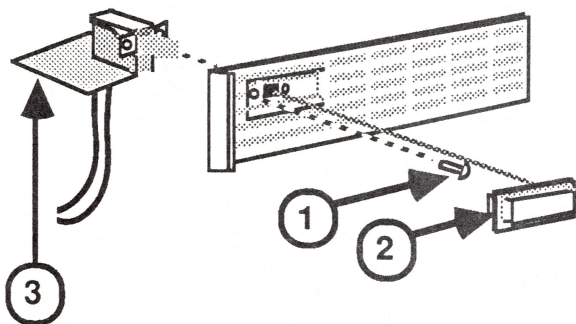


FIGURE 23

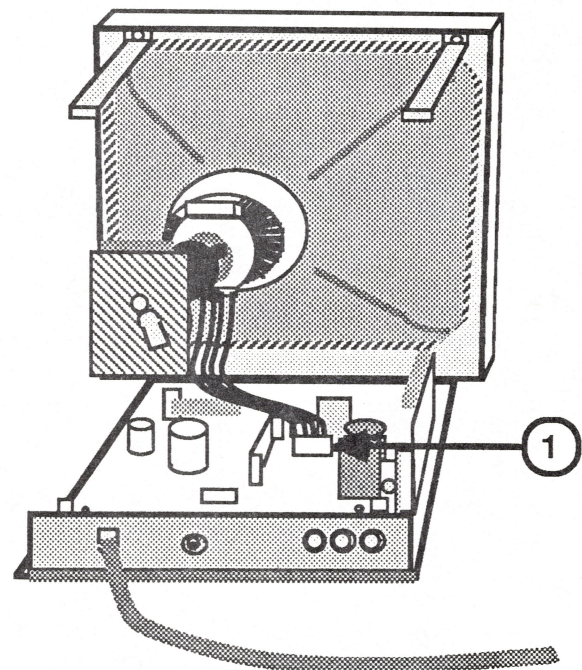


FIGURE 24

7. Replace the customer's five front plastic control knobs on the logic board adjustment pots.
8. With the front bezel (with CRT) on its feet, slide the main logic board under the CRT neck about three inches away from the base of the CRT.
9. Reconnect the on/off switch:

For the IIe:

- a. Replace the two screws securing the switch assembly to its mounting bracket.
- b. Replace the customer's switch button on its shaft.
- c. Replace the two screws which secure the on/off switch to the front bezel (Figure 22, #1).

For the IIc:

- a. Replace the screw (Figure 23, #1) which secures the on/off switch to the plastic bracket. The small switch PCB (Figure 23, #3) is on the bottom as you insert the switch unit into the plastic bracket.
- b. Replace the customer's switch button (Figure 23, #2) on its shaft.

10. For the IIe or IIc, Rev. A service module only:  
Reconnect the CRT connector (red/blue/yellow/green) to the power supply board.

For the IIe or IIc, Rev. B service module only:

Reconnect the CRT connector (red/blue/yellow/green) to the logic board (Figure 24, #1).

**CAUTION:** Be sure that this and all connector wires are placed under the CRT neck.



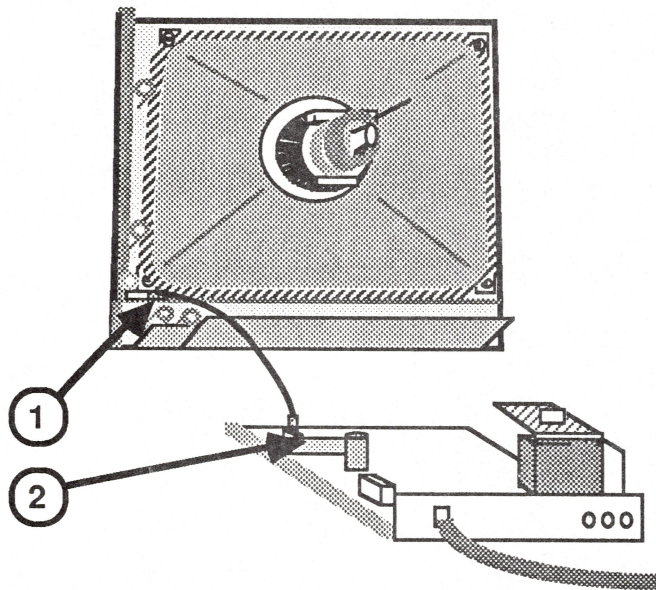


FIGURE 25

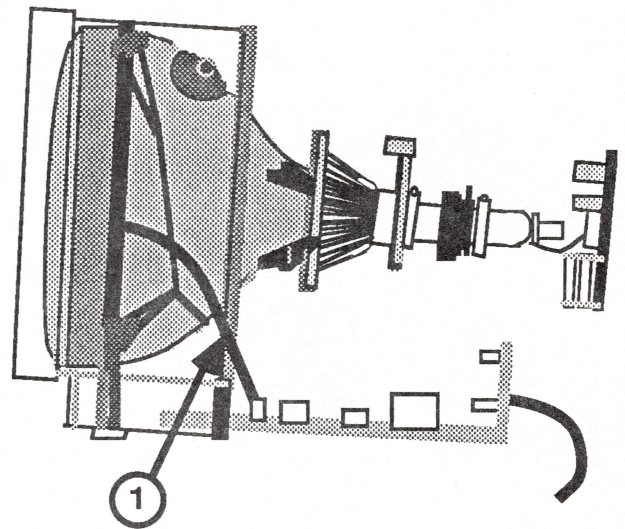


FIGURE 26

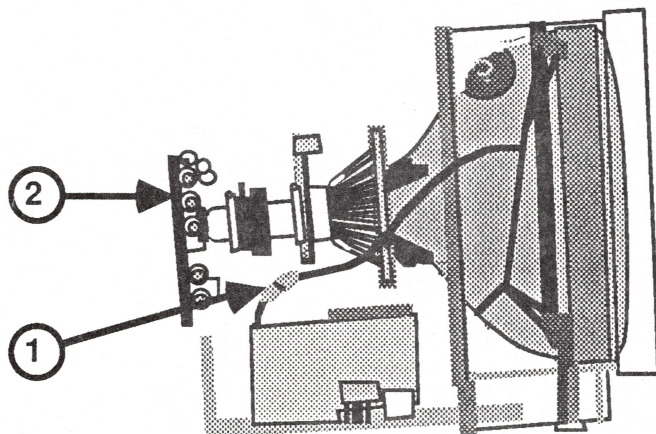


FIGURE 27

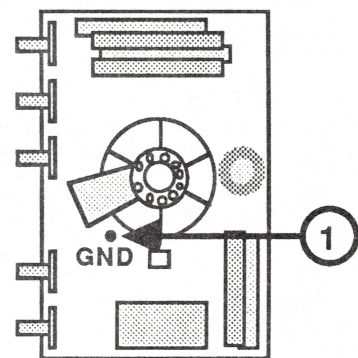


FIGURE 28

11. Reconnect the LED as directed below.

For the IIe or IIc, Rev. A service module only:

Reconnect the LED cable (Figure 25, #1) to the small, vertically mounted video PCB attached to the main logic PCB (Figure 25, #2).

For the IIe or IIc, Rev. B service module only:

Reconnect the LED cable to the main logic PCB.

**NOTE:** If you have replaced a faulty Rev. A logic board with a Rev. B service module (or vice versa), the LED will not work because the polarity of the LED circuitry was reversed when the board was redesigned. The problem can be corrected by reversing the leads on the LED. For directions, see "LED Polarity Reversal Procedure - Series H" in **Section 0, Service Notes**.

12. Slide the main logic PCB into the front bezel so that the control knobs fit through the holes in the front of the unit. **(In order for the main logic assembly to now fit into the IIe bezel, you must have installed the extension bracket, as directed in the NOTE at the beginning of this procedure.)**
13. Reconnect the degaussing coil ground strap to connector W on the main logic PCB (Figure 26, #1), making sure the "W" on the side of the connector is matched to the "W" on the logic board.
14. Reconnect the white CRT ground strap at its plug-in connector (Figure 27, #1).
15. Reconnect the gray CRT ground strap to the CRT socket board (Figure 28, #1).
16. Reconnect the CRT socket board to the CRT neck (Figure 27, #2). It fits only one way.
17. Replace the anode cap. (See "Discharging the Cathode Ray Tube.")
18. Replace the rear cover. (See "Replacing the Rear Cover.")



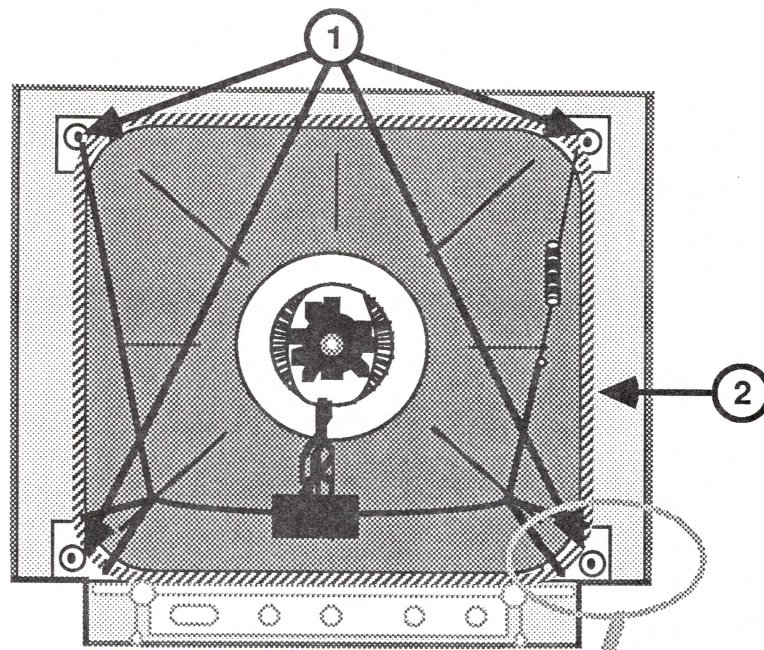


FIGURE 29

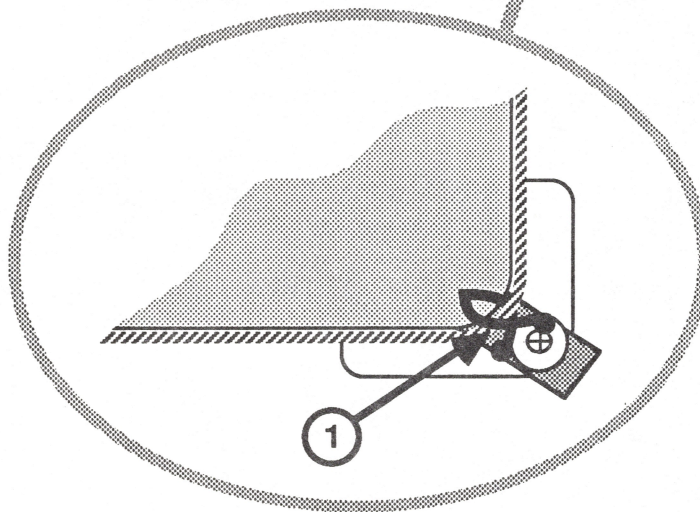


FIGURE 30

## **REMOVING THE CATHODE RAY TUBE (CRT) - Series "H"**

1. Turn off the monitor and disconnect the AC cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube.")
4. Remove the logic board. (See "Removing the Main Logic PCB.")
5. Place the monitor face down on a protective pad.
6. Unscrew the four CRT mounting screws (Figure 29, #1).
7. Carefully lift the CRT/degaussing coil assembly out of the front bezel. On the IIc, the degaussing coil (Figure 29, #2) is mounted to the CRT with plastic holding tabs (Figure 30, #1). On the IIe, the degaussing coil is mounted inside the bezel and must be removed separately (after the CRT is removed).

**WARNING: IF YOU INTEND TO DISPOSE OF THE CRT, REFER TO "Disposing of the Cathode Ray Tube" IN SECTION 1.**



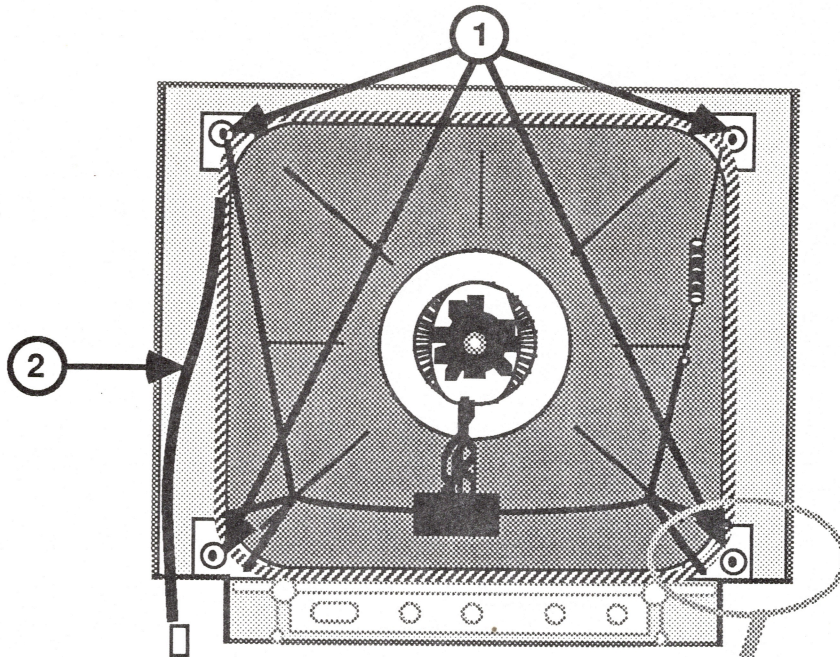


FIGURE 31

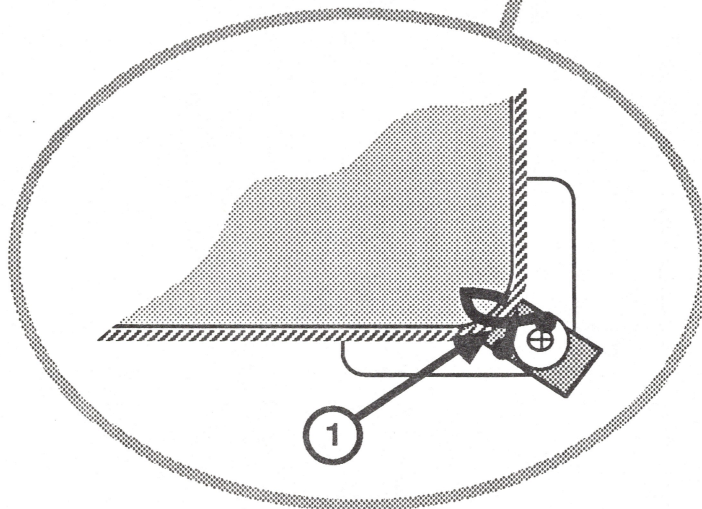


FIGURE 32

## REPLACING THE CATHODE RAY TUBE (CRT) - Series "H"

1. Place the front bezel face down on a clean, soft surface.
2. Replace the LED assembly. (See "Replacing the LED Assembly.")
3. Replace the CRT/degaussing coil assembly:

On the IIc:

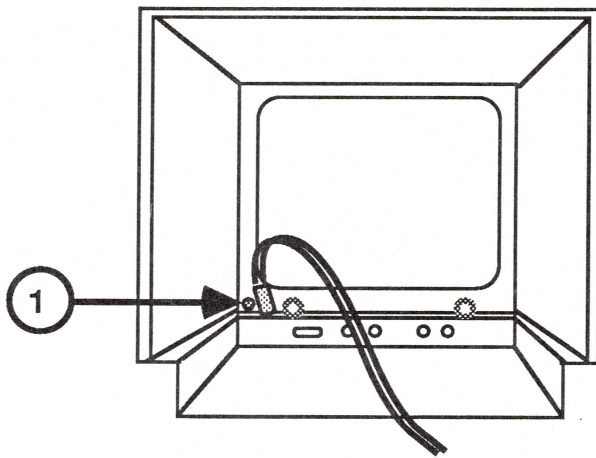
Carefully place the entire CRT/degaussing coil assembly into the front bezel, making sure the degaussing coil ground strap (Figure 31, #2) is on the left side as you face the back of the monitor.

On the IIe:

Place the degaussing coil around the inside front of the bezel, making sure the degaussing coil ground strap is on the left side as you face the back of the monitor. Then carefully set the CRT into the front bezel, over the degaussing coil. The degaussing coil will no longer be visible.

4. Tighten the four CRT mounting screws (Figure 31, #1) through the mounting brackets at the corners of the CRT. On the IIc, make sure each screw is also positioned through the plastic holding tabs (Figure 32, #1).
5. Replace logic board. (See "Replacing the Main Logic PCB.")
6. Replace the rear cover. (See "Replacing the Rear Cover.")





**FIGURE 33**

#### **REMOVING THE LED ASSEMBLY (IIc ColorMonitor only) - Series "H"**

1. Turn off the monitor and disconnect the AC cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube.")
4. Remove the main logic PCB. (See "Removing the Main Logic PCB.")
5. Remove the Cathode Ray Tube (CRT). (See "Removing the Cathode Ray Tube.")
6. Remove the screw (Figure 33, #1) that secures the plastic bracket of the LED assembly to the front bezel.

#### **REPLACING THE LED ASSEMBLY (IIc ColorMonitor only) - Series "H"**

1. Replace the screw (Figure 33, #1) that holds the LED assembly in place inside the front bezel.
2. Replace the Cathode Ray Tube (CRT). (See "Replacing the Cathode Ray Tube.")
3. Replace the main logic PCB. (See "Replacing the Main Logic PCB.")
4. Replace the rear cover. (See "Replacing the Rear Cover.")



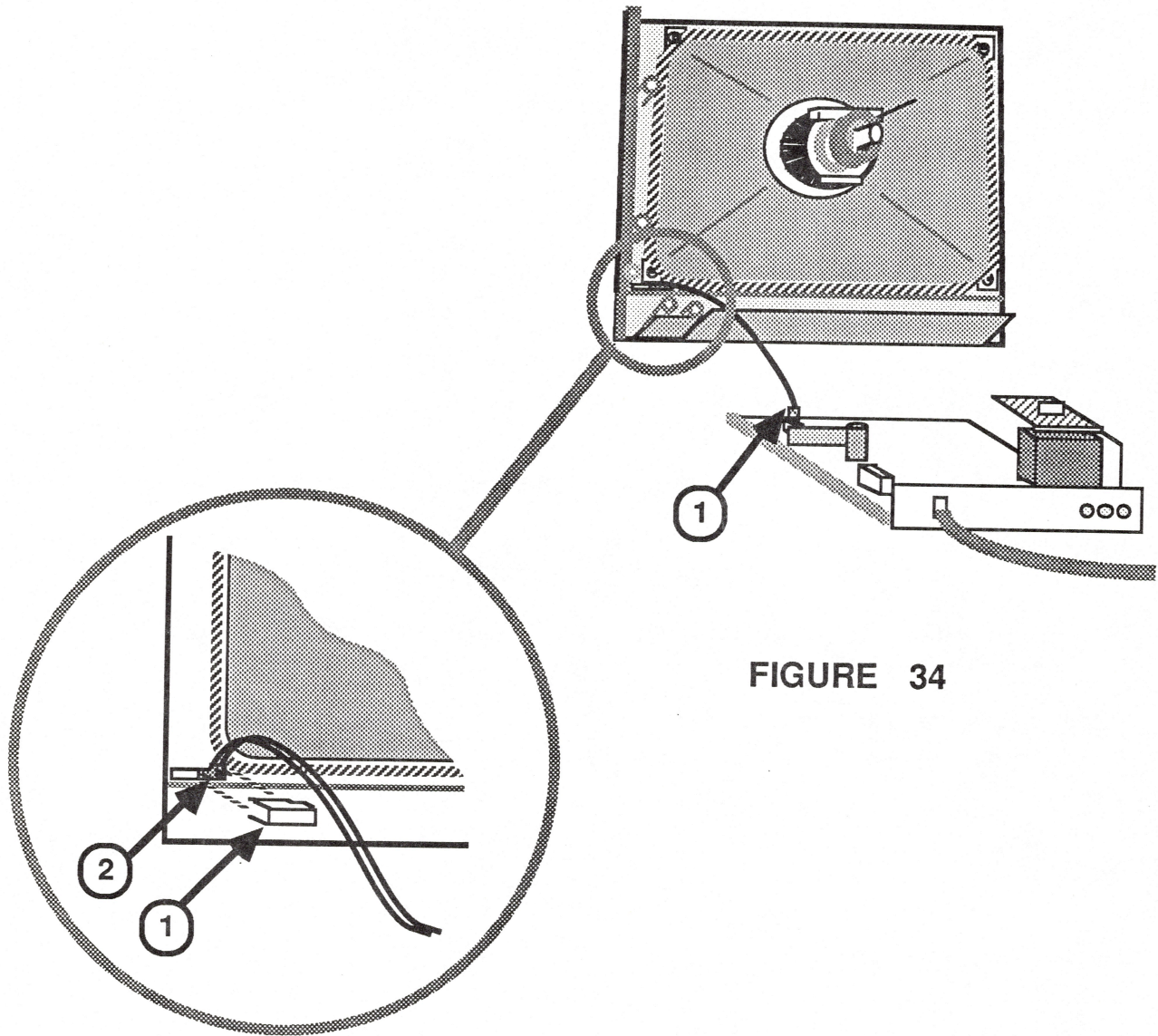


FIGURE 34

FIGURE 35

## REMOVING THE LED ASSEMBLY (IIE ColorMonitor only) - Series "H"

1. Turn off the monitor and disconnect the AC cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube.")
4. For Rev. A only:  
Disconnect the LED cable from the small, vertically mounted video PCB attached to the main logic PCB (Figure 34, #1).  
  
For Rev. B only:  
Disconnect the LED cable from the main logic PCB.
5. Pull off the clear plastic cap (Figure 35, #1) that secures the LED to the front bezel.
6. Pull the LED free from the front bezel.

## REPLACING THE LED ASSEMBLY (IIE ColorMonitor only) - Series "H"

1. Position the LED assembly in its appropriate place inside the front bezel (Figure 35, #2).
2. Replace the clear plastic cap (Figure 35, #1) that secures the LED to the front bezel.
3. For Rev. A only:  
Reconnect the LED cable to the small, vertically mounted video PCB attached to the main logic PCB (Figure 34, #1).

For Rev. B only:  
Reconnect the LED cable to the main logic PCB.

**NOTE:** The polarity of the LED circuitry on the ColorMonitor IIE, Series H, Rev. B, is reversed from that of Rev. A. This means that LEDs designed to work with Rev. A logic boards will not work with Rev. B logic boards. After you have reconnected the LED to the main logic board, power on the monitor to ensure that the LED lights. If it does not, reverse the leads of the LED. (See "LED Polarity Reversal Procedure - Series H" in **Section 0, Service Notes.**)

4. Replace the rear cover. (See "Replacing the Rear Cover.")



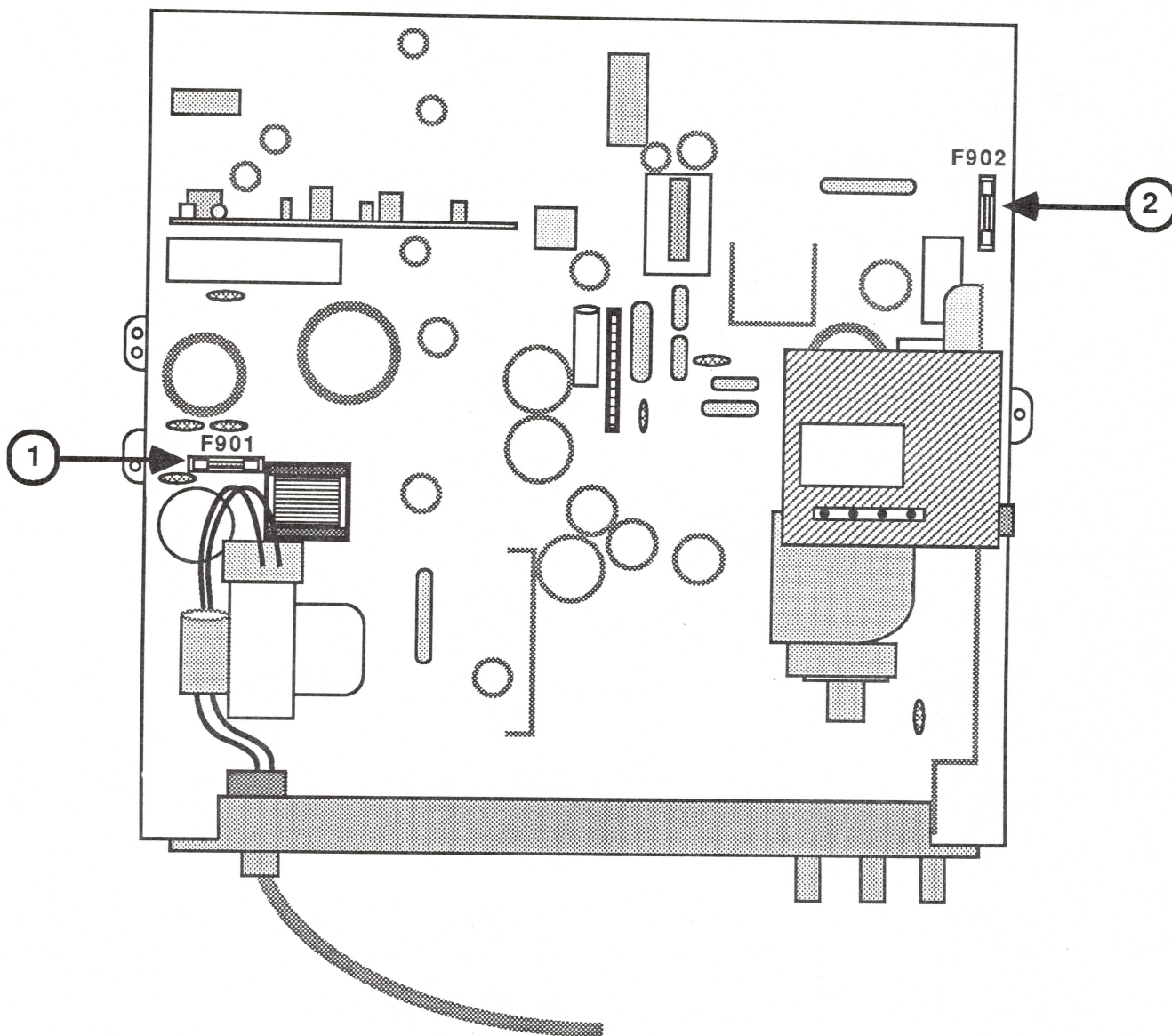


FIGURE 36

## REPLACING THE LOGIC BOARD FUSES (F901 and F902) - Series "H"

Both fuses are mounted to the component side of the main logic PCB (Figure 32).

1. Disconnect the AC power cord.
2. Remove the rear cover. (See "Removing the Rear Cover.")
3. **DISCHARGE THE CRT.** (See "Discharging the Cathode Ray Tube.")
4. **Check fuse F901 to see whether you need to perform the Fuse Upgrade Procedure.**

- a. Carefully remove fuse F901 (Figure 36, #1) by prying at one metal end, then the other, to remove the fuse from the fuse holder.

**CAUTION: DO NOT TRY TO SLIDE THE FUSE SIDEWAYS. YOU MAY BREAK THE FUSE HOLDER.**

- b. If the F901 fuse is a 3.15 Amp 250 V fuse, **you must perform the Upgrade Procedure before continuing, (see Section 0, Service Notes). The Upgrade Procedure replaces the 3.15 Amp 250 V fuse with a 4 Amp 125V fuse.**
  - c. If a 4 Amp 125V fuse has already been installed, check to see that it is good. If it is not, replace it with a new 4 Amp 125 V fast blow fuse.
5. Now check fuse F902 (Figure 36, #2). If it is burned out, replace it with a 1 Amp Fast Blow fuse.
  6. Replace the rear cover. (See "Replacing the Rear Cover.")



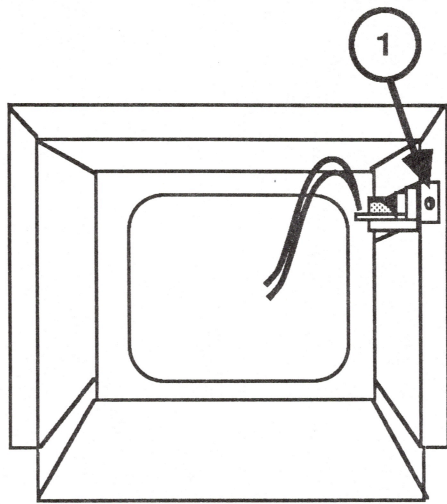


FIGURE 37

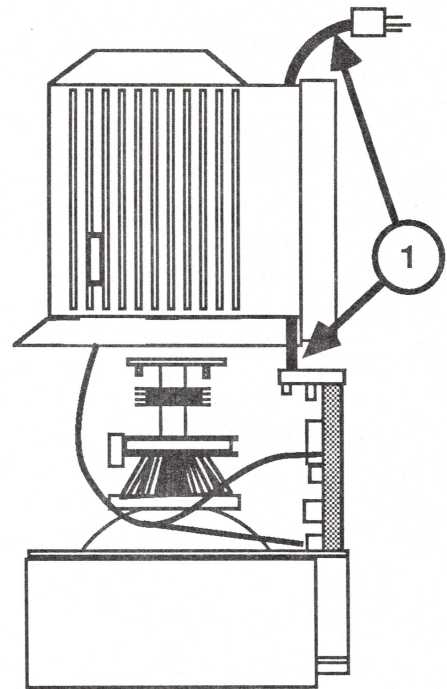


FIGURE 38

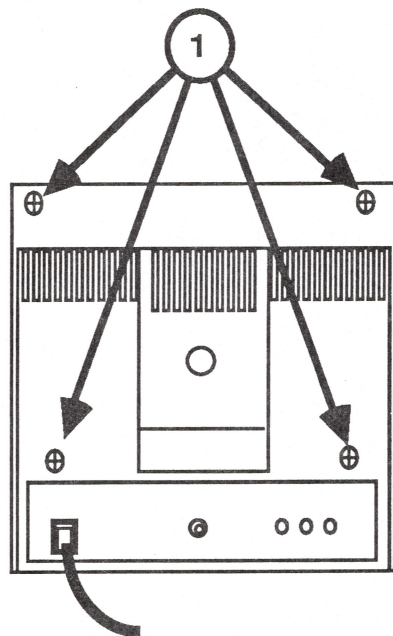


FIGURE 39

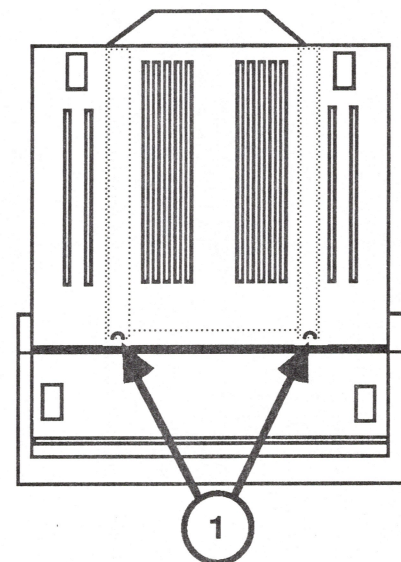


FIGURE 40

## REPLACING THE REAR COVER (IIc ColorMonitor only) - Series "H"

1. Replace the screw which holds the on/off switch bracket to the rear cover (Figure 37, #1).
2. Orient the rear cover and monitor as shown in Figure 38; the monitor is face down.
3. Guide the AC power cord through the opening in the rear cover while you lower the cover onto the monitor (Figure 38, #1).
4. Replace the four screws (Figure 39, #1) at the back of the monitor.
5. Replace the two screws (Figure 40, #1) at the bottom of the monitor.
6. Set the monitor back on its feet.
7. Run the monitor tests on the Apple II Peripherals Diskette (or equivalent) to verify that the monitor is functioning properly. Equivalent diagnostics are those that generate color bars or test patterns and can thus verify the monitor's color operation.



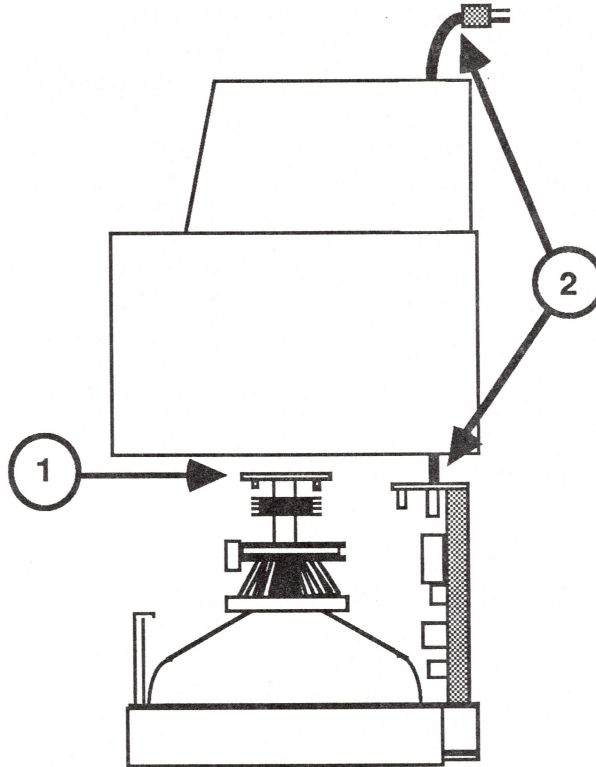


FIGURE 41

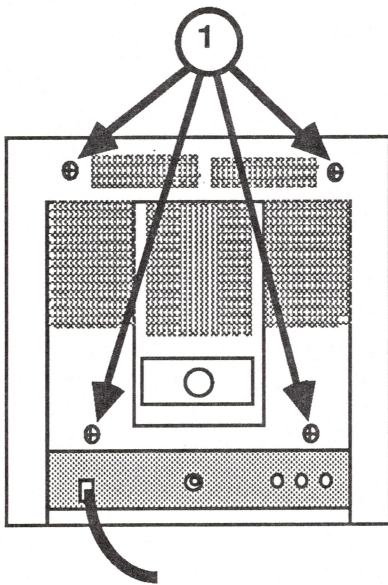


FIGURE 42

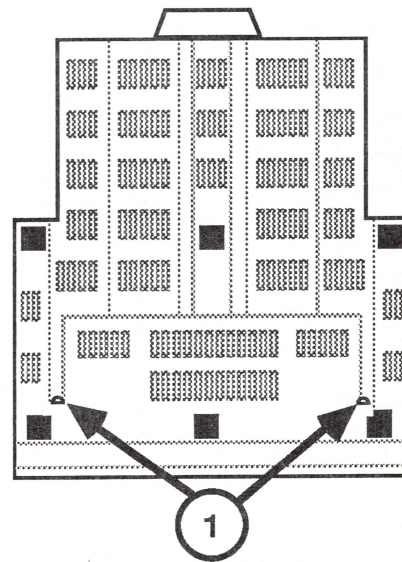


FIGURE 43

## REPLACING THE REAR COVER (IIe ColorMonitor only) - Series "H"

1. Orient the rear cover and monitor as shown in Figure 41; the monitor is face down.
2. Guide the AC power cord (Figure 41, #1) through the opening in the cover while you lower the cover onto the monitor.
3. Replace the four screws (Figure 42, #1) at the back of the monitor.
4. Replace the two screws (Figure 43, #1) at the bottom of the monitor.
5. Run the monitor tests on the Apple II Peripherals Diskette (or equivalent) to verify that the monitor is functioning properly. Equivalent diagnostics are those that generate color bars or test patterns and can thus verify the monitor's color operation.



# Apple ColorMonitor IIe/IIc Technical Procedures

## Section 4

### Adjustments

#### Contents:

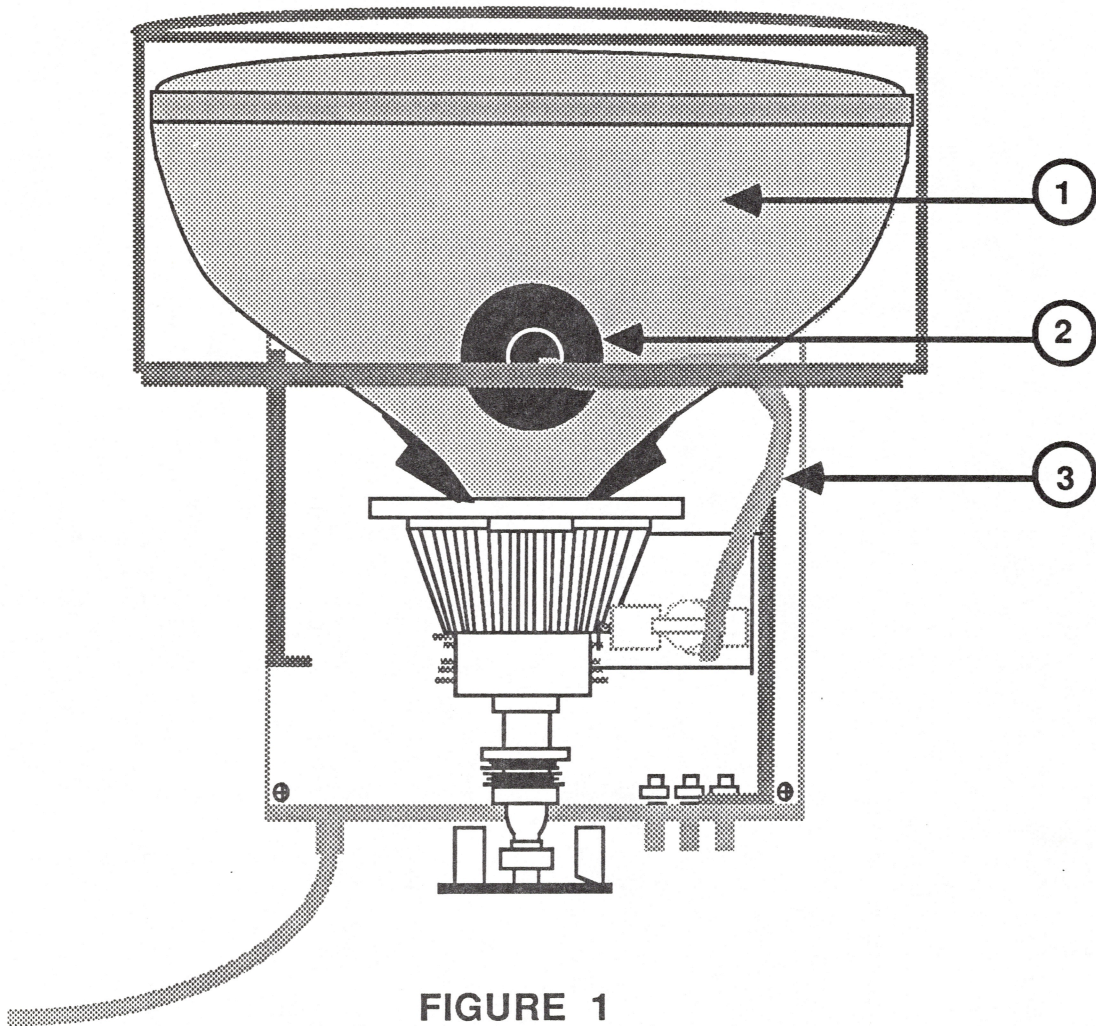
Introduction.....	4.3
Text (Black & White) Adjustments.....	4.5
Color Adjustments	
Materials Needed.....	4.7
Adjustment Procedure Series "S".....	4.7
Adjustment Procedure Series "H".....	4.11

**WARNING:** The Series "H" Rev. B monitor and service module have an "AC/DC transformerless" design -- that is, there is no isolation transformer on the AC power circuit, and the chassis is connected to the neutral line. With such designs, IF THE POWER PLUG IS INSERTED BACKWARDS INTO THE OUTLET (OR IF THE OUTLET IS WIRED BACKWARDS) THE CHASSIS CARRIES A LETHAL CURRENT.

Use only a three-prong grounded electrical outlet installed by a qualified electrician, and do not under any circumstances use an adaptor plug. FOR YOUR SAFETY, APPLE URGES YOU TO USE AN ISOLATION TRANSFORMER BETWEEN THE MONITOR AND THE ELECTRICAL OUTLET.

DO NOT ATTEMPT TO MAKE ANY ADJUSTMENTS ON THE REV. B MONITOR OTHER THAN THOSE DIRECTED HEREIN, AND DO THOSE WITH EXTREME CAUTION!!!

The Series "H" Rev. B monitors and service modules may be identified by the absence of a separate power supply board.





## INTRODUCTION

The ColorMonitor IIe/IIc has two modes of operation - text and color. In exceptional circumstances one or both modes may need adjustment following the replacement of the main logic PCB or other modules. After any such service, check the text and color production by viewing any program(s) generating text (black & white) and color.

**DO NOT CHANGE THE INTERNAL COLOR ADJUSTMENTS IF THE COLOR PRODUCTION IS WITHIN ACCEPTABLE RANGE!** Perfect color adjustments require special equipment. The color adjustments given in this section will only allow you to achieve an acceptable level of color production in those rare cases where adjustment is necessary.

All yoke adjustments have been preset by the manufacturer. Do not attempt to make any tilt, ring, or geometric adjustments on the ColorMonitor. If the customer's monitor exhibits adjustment problems which cannot be corrected using the following procedures, use the procedures found in the "Troubleshooting" section to isolate the faulty module, and return that module to Apple for repair.

### The Apple II Peripherals Diskette

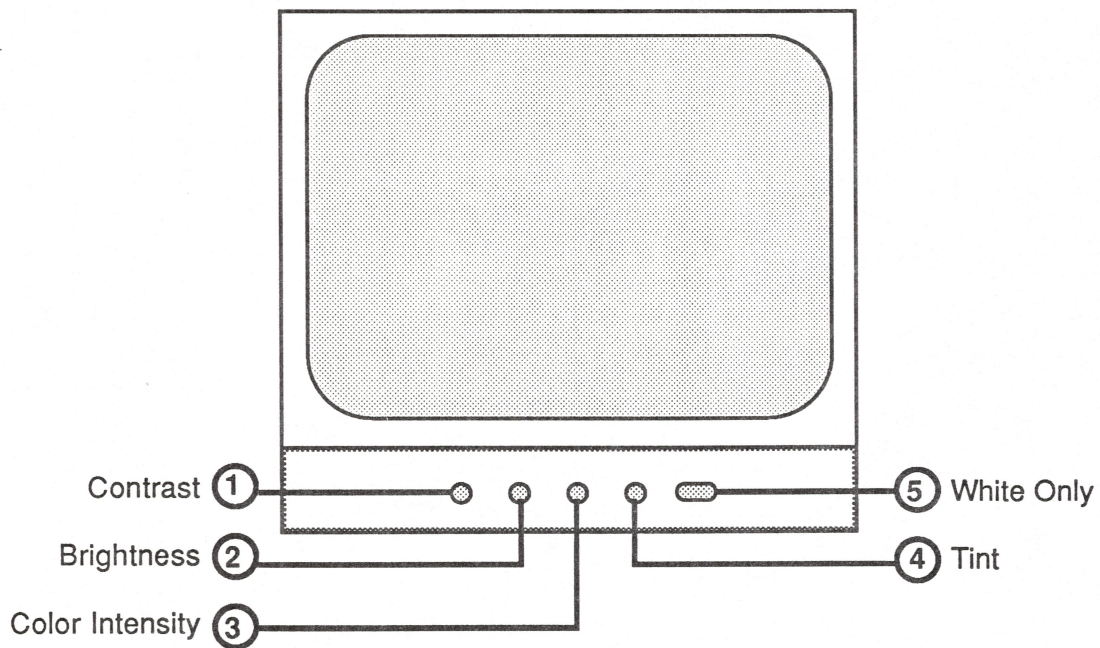
The Apple II Peripherals Diskette contains test patterns you can use when making adjustments to this or any monitor. The monitor test patterns generated include:

Dot Pattern	40 Column Display	Color Bars
Grid Pattern	80 Column Display	Full White Screen

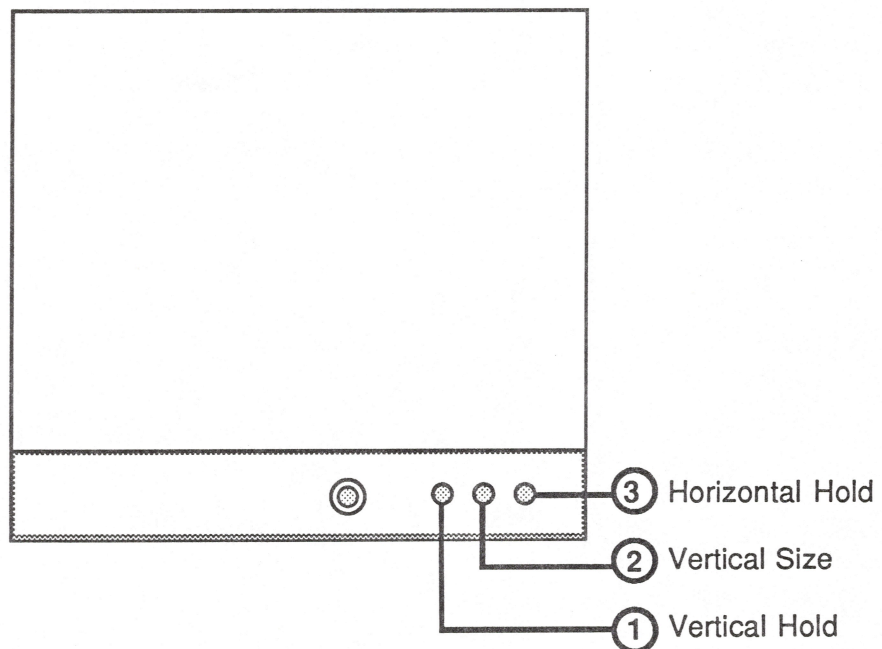
When a monitor needs adjustment, begin by adjusting the text display, then adjust the color (graphics) display.

### WARNING !!!

**THERE ARE EXTREMELY HIGH VOLTAGES ON THE TUBE, THE ANODE, THE ANODE LEAD, AND IN THE POWER SUPPLY AREA. DURING THESE ADJUSTMENTS YOU WILL BE PUTTING YOUR HAND NEAR THESE HIGH VOLTAGE PARTS WHILE THE POWER IS ON. WATCH WHAT YOU ARE TOUCHING WHILE MAKING THESE ADJUSTMENTS. AVOID TOUCHING THE TUBE, ANODE, OR ANODE LEAD (FIGURE 1, #1, #2, AND #3), OR THE POWER SUPPLY AREA. USE ONLY ONE HAND TO MAKE ALL ADJUSTMENTS! NEVER HOLD THE CHASSIS WITH YOUR FREE HAND WHILE MAKING ADJUSTMENTS.**



**FIGURE 2**



**FIGURE 3**



## TEXT (BLACK AND WHITE) ADJUSTMENTS

### Series "S" and Series "H"

Text adjustments are identical for Series "S" and Series "H" monitors. All text adjustment controls are located on the front and rear panels of the monitor and thus are accessible to both the dealer and the customer.

1. Connect the video cable and the power cords of the monitor and the IIc or IIe computer. Load the Apple II Peripherals Diskette into the computer and turn on the computer and the monitor. (**NOTE:** Any program that generates a 40 or 80 column text display may be used in place of the Peripherals Diskette.)
2. Select "Monitor Tests" from the program's main menu.
3. Select "40 Column Display" or "80 Column Display" from the monitor menu.
4. Open the access door on the lower front of the monitor.
5. Turn the **BRIGHTNESS** control (Figure 2, #2) to adjust the visibility of the screen to room lighting conditions.
6. Rotate the **CONTRAST** control (Figure 2, #1) to achieve a good balance between character brightness and screen background.

**NOTE:** The **COLOR INTENSITY** control (Figure 2, #3), the **TINT** control (Figure 2, #4), and the **WHITE ONLY** switch (Figure 2, #5) have no effect on the text display.

7. Locate the **VERTICAL HOLD** control on the back panel of the monitor (Figure 3, #1). If the picture is moving vertically, turn the control until the picture becomes stable.
8. If the picture looks stretched, so that the characters on the top and bottom lines are partially lost, or if the characters look squashed, turn the **VERTICAL SIZE** control (Figure 3, #2) until you have lengthened or shortened the picture to the desired degree.
9. If the picture is moving horizontally, turn the **HORIZONTAL HOLD** control (Figure 3, #3) until the picture becomes stable.

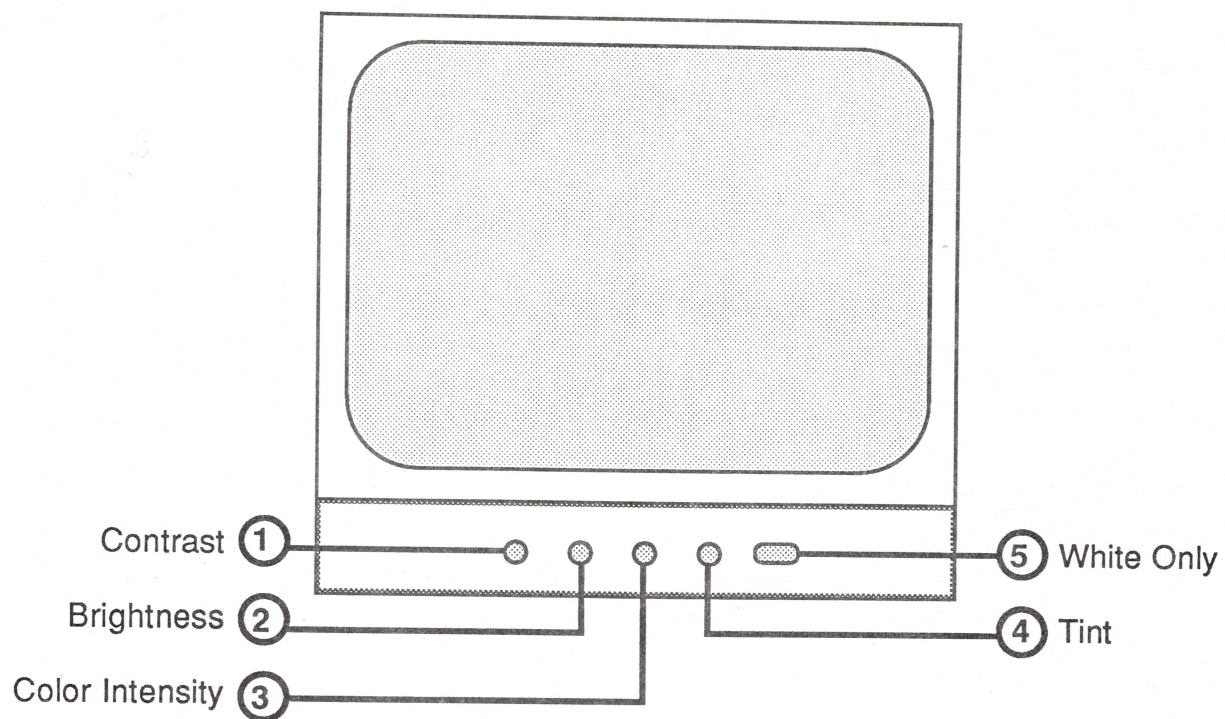


FIGURE 4

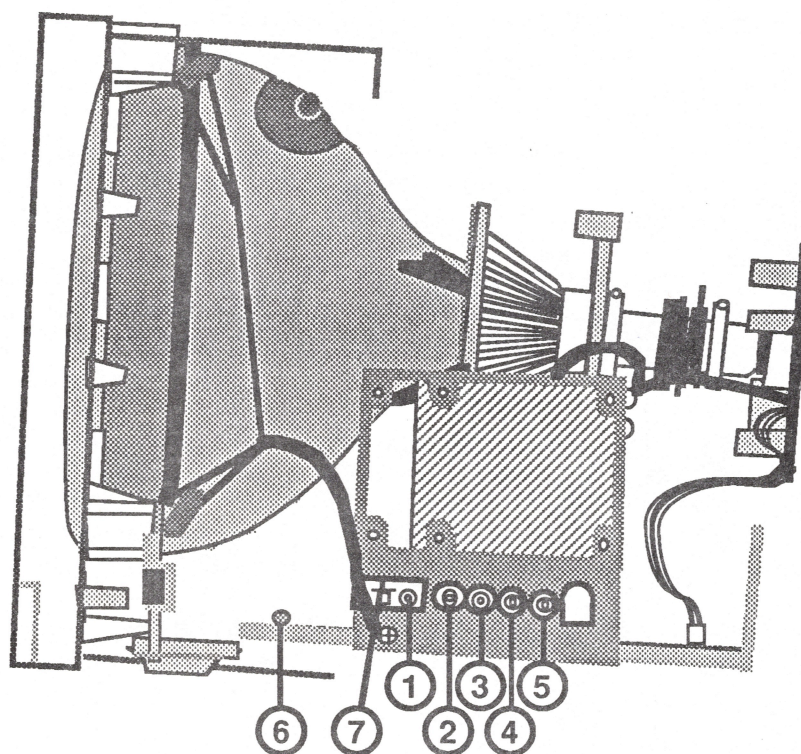


FIGURE 5



## COLOR ADJUSTMENTS

### Materials Needed

Apple ColorMonitor IIe/IIc  
Apple IIe or IIc computer  
Isolation transformer (for Series "H" Rev. B)  
Apple II Peripherals Diskette  
Small plastic flatblade screwdriver (tweaker)  
or plastic alignment tool  
Mirror with prop (for viewing screen during adjustments)

### Color Adjustment Procedure - Series "S"

1. Turn the monitor off and disconnect the power cord.
2. Disconnect the video cable from the back of the monitor.
3. Remove the rear cover. (See "Removing the Rear Cover" in the Series "S" Take-Apart section.)
4. Set the monitor on its feet, reconnect the power cord and video cable, and turn on the monitor and the computer.
5. Allow the monitor to warm up for at least 15 minutes.
6. Prop the mirror in front of the screen so that you can see the results of your adjustments as you work.
7. Turn the **COLOR INTENSITY** control (Figure 4, #3) on the front panel to its maximum counter-clockwise position.
8. Adjust the front panel **BRIGHTNESS** control (Figure 4, #2) to its detent (click) position.
9. Adjust the **CONTRAST** control (Figure 4, #1) to its maximum clockwise position.
10. Depress the **WHITE ONLY** switch (Figure 4, #5).
11. Locate the internal color controls behind the power supply board (Figure 5). **WARNING: THE POWER SUPPLY BOARD HAS EXTREMELY HIGH VOLTAGES. USE THE INSULATED TOOL IN ONE HAND ONLY, AND WATCH WHAT YOU ARE TOUCHING!**
12. Using the plastic alignment tool or insulated screwdriver, set the following controls to their mechanical centers:
  - a. **R-DRIVE** (red) - Figure 5, #1

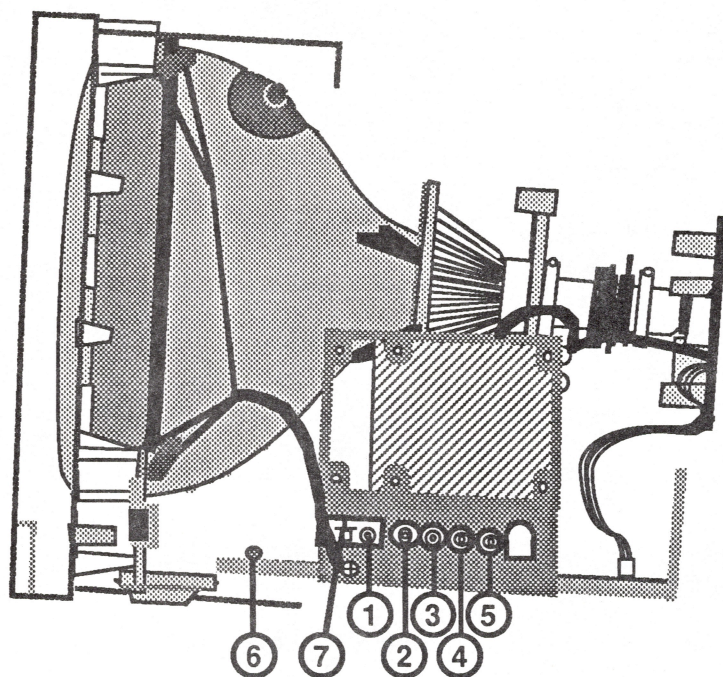


FIGURE 6

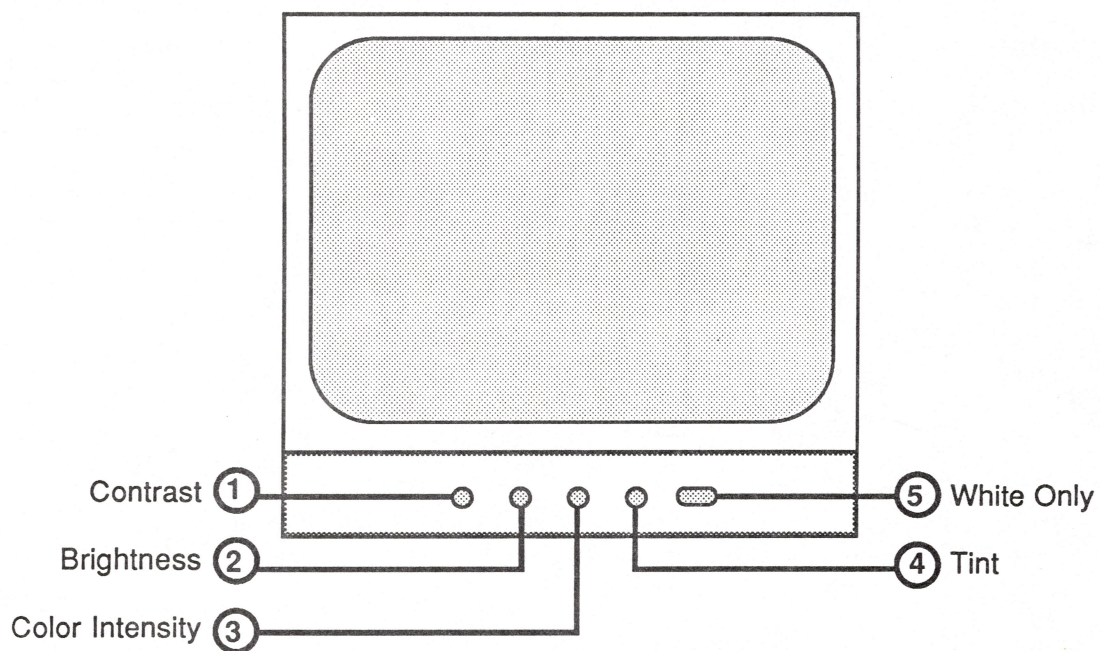


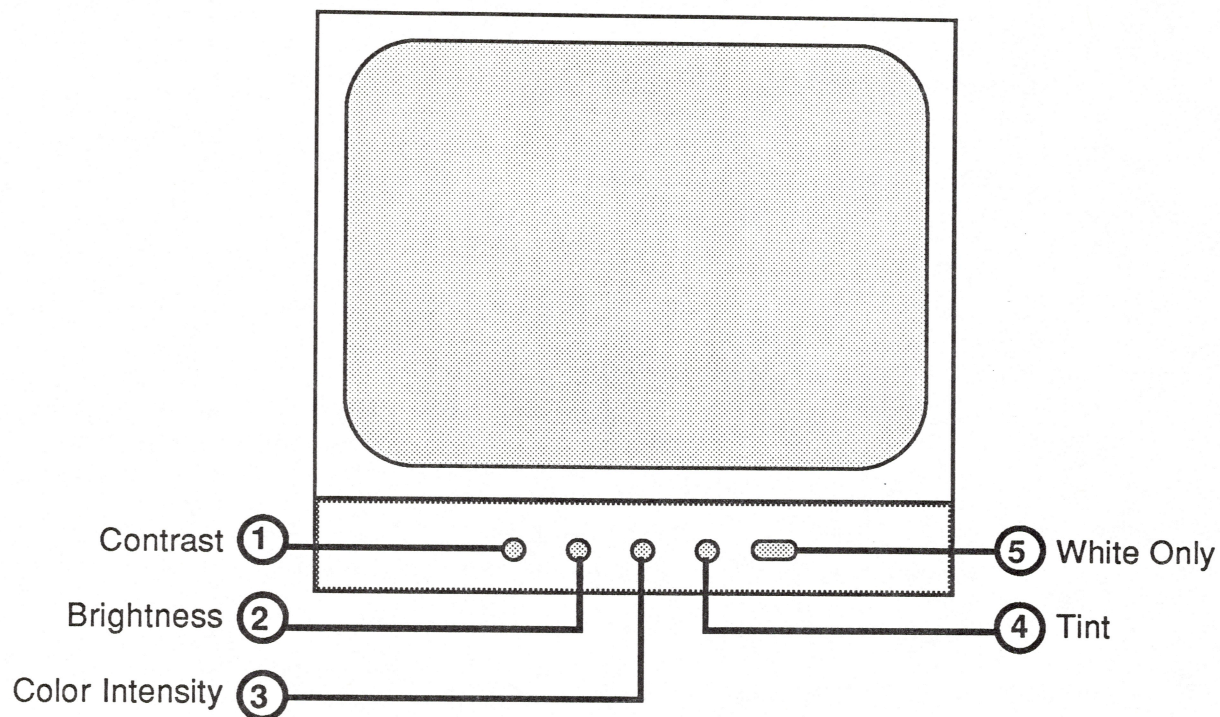
FIGURE 7



- b. **B-DRIVE** (blue) - Figure 6, #2
- c. **R-BIAS** (red) - Figure 6, #3
- d. **G-BIAS** (green) - Figure 6, #4
- e. **B-BIAS** (blue) - Figure 6, #5
- f. **SUB-BRIGHTNESS** - Figure 6, #6

**NOTE:** To find mechanical center, turn the pot clockwise as far as possible, then counter-clockwise as far as possible. Mechanical center is exactly halfway between those two extremes.

13. Position the **SERVICE** switch (SW800) lever (Figure 6, #7) so that the lever points toward the picture tube at a 45° angle. The screen should now display a single horizontal line. Note the hue of the single horizontal line on the display screen. It must be adjusted so that it is white (neutral). No predominant color (red, blue, or green) should be visible. If the line is white, skip to step 16. However, if a predominant color is present within the horizontal line, proceed to step 14.
14. Make a slight counterclockwise adjustment to the **BIAS** control (red, green, or blue) that corresponds to the predominant color within the horizontal line.
15. Repeat step 14 until the horizontal line on the display screen is a neutral white.
16. Set the **SERVICE** switch (Figure 6, #7) back to its original position (with the lever pointing towards the back of the monitor).
17. Return the **WHITE ONLY** switch (Figure 7, #5) to its normal position (out).
18. Install the Apple II Peripherals Diskette into the drive and start up the program.
19. Select "Monitor Tests" from the main menu.
20. Select "Color Bars" from the monitor menu.
21. Adjust the **SUB-BRIGHTNESS** control (Figure 6, #6) so that the background on the display screen is black (no grain or grid is showing). Adjusting the **SUB-BRIGHTNESS** control in the clockwise direction increases the screen brightness level.



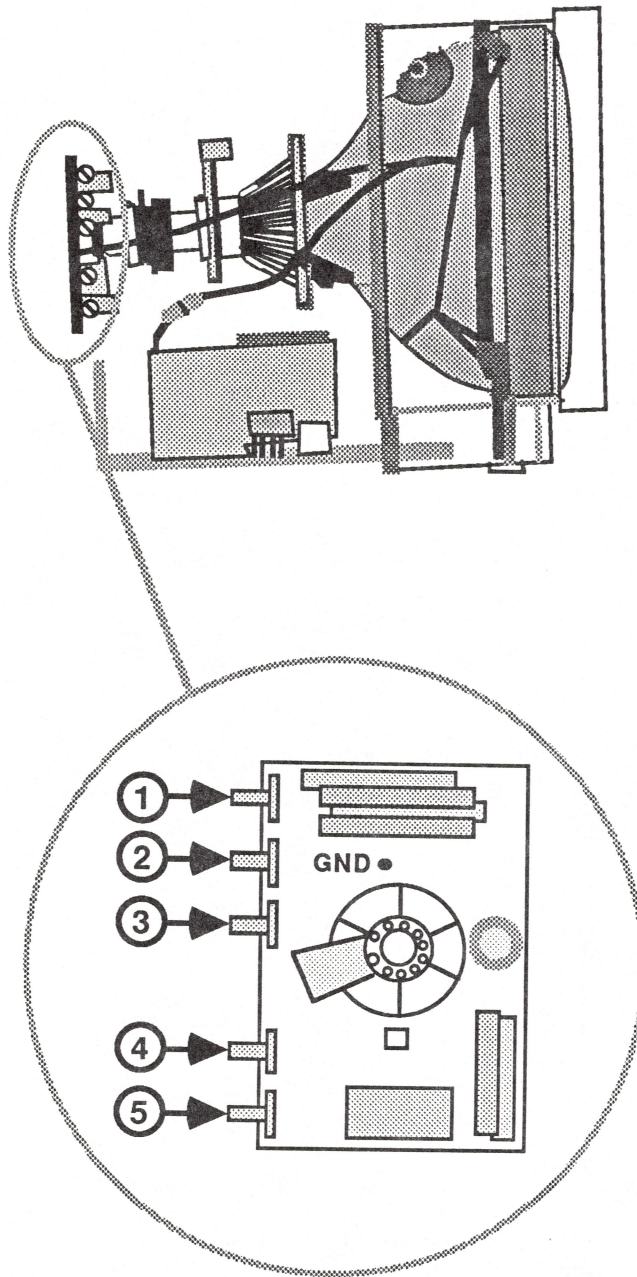
**FIGURE 8**



22. Adjust the **COLOR INTENSITY** control (Figure 8, #3) and the **CONTRAST** control (Figure 8, #1) for optimum color viewing.
23. Adjust the **TINT** control (Figure 8, #4) until the yellow color bar is at its yellowest hue.
24. Turn off the monitor and the computer and disconnect the video cable and power cords.
25. Replace the rear cover. (See "Replacing the Rear Cover" in the Series "S" Take-Apart section.)

#### Color Adjustment Procedure - Series "H"

1. Turn the monitor off and disconnect the power cord.
2. Disconnect the video cable from the back of the monitor.
3. Remove the rear cover. (See "Removing the Rear Cover" in the Series "H" Take-Apart section.)
4. Set the monitor on its feet and reconnect the power cord and video cable. (**READ AND FOLLOW WARNING**, p. 4.1.)
5. Install the Apple II Peripherals Diskette in the drive and turn on the computer and the monitor.
6. Allow the monitor to warm up for at least 15 minutes.
7. Select "Monitor Tests" from the program's main menu.
8. Select "Color Bars" from the monitor menu.
9. Adjust the **CONTRAST** control (Figure 8, #1) to its full clockwise position.
10. Adjust the **BRIGHTNESS** control (Figure 8, #2) to its optimum viewing condition.
11. Press <ESCAPE> to return to the monitor menu.
12. Select "Full White Screen" from the monitor menu.
13. Adjust the **COLOR INTENSITY** control (Figure 8, #3) to its maximum counter-clockwise position.
14. Depress the **WHITE ONLY** switch on the front panel (Figure 8, #5).



**FIGURE 9**



15. Locate the internal color controls on the CRT socket board (Figure 9).

**NOTE:** The Series "H" monitors do NOT have a SERVICE switch.

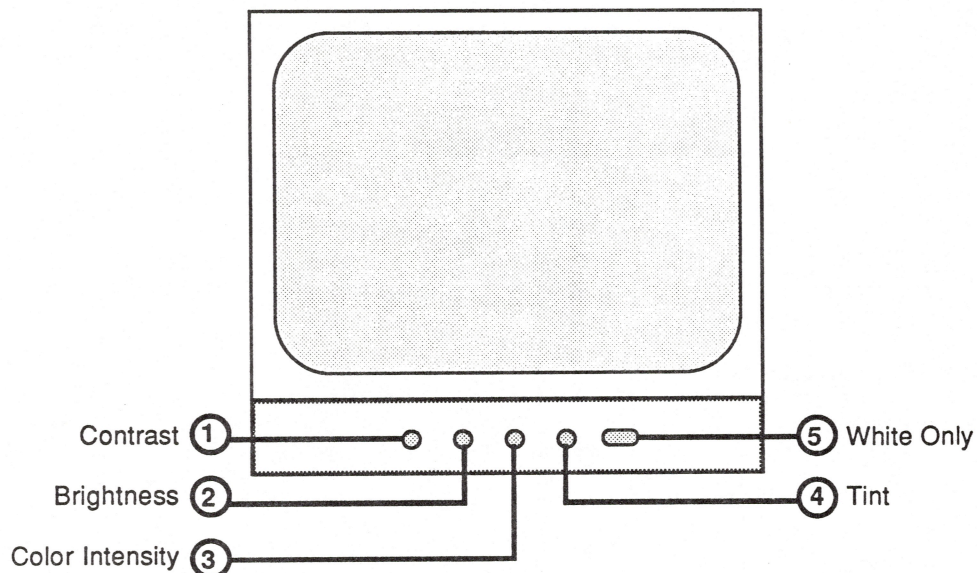
16. Using a plastic alignment tool or insulated screwdriver AND USING EXTREME CAUTION, set the controls as follows:

- a. B-DRIVE (Figure 9, #1) - 1/2 clockwise position.
- b. R-DRIVE (Figure 9, #4) - 3/4 clockwise position.
- c. B-BKG (Figure 9, #2) - 1/2 clockwise position.
- d. G-BKG (Figure 9, #3) - 1/4 clockwise position.
- e. R-BKG (Figure 9, #5) - 1/2 clockwise position.

**NOTE:** To set a pot at a given position, first find its mechanical center by turning clockwise as far as possible, then counter-clockwise as far as possible. Mechanical center is exactly halfway between those two extremes. The 1/4 clockwise position is halfway between the maximum counter-clockwise position and mechanical center; the 3/4 clockwise position is halfway between mechanical center and the maximum clockwise position.

17. Rotate the B-DRIVE control (Figure 9, #1) clockwise until the raster begins to appear bluish.
18. Rotate the R-BKG control (Figure 9, #5) to its 1/4 clockwise position, then rotate it clockwise until the raster just begins to show a reddish hue.
19. Alternately adjust the B-BKG and G-BKG controls (Figure 9, #2 and #3) until the raster is a grayish-white. No predominant color (red, blue, or green) should be visible. These controls should not have to be turned very far in the clockwise direction to achieve a neutral grayish-white raster.
20. Press <ESCAPE> to return to the monitor menu.
21. Select "Color Bars" from the monitor menu.

22. Return the **WHITE ONLY** switch (Figure 10, #5) to its normal position (out).
23. Adjust the front panel **COLOR INTENSITY** control (Figure 10, #3) until the raster displays the desirable amount of color.
24. Adjust the front panel **TINT** control (Figure 10, #4) so that the color block marked "Yellow" is at its yellowest hue.
25. Set the front panel **BRIGHTNESS** control (Figure 10, #2) so that the background behind the color bar pattern appears black.
26. Adjust the front panel **CONTRAST** control (Figure 10, #1) for optimum viewing comfort.
27. The color adjustment should now be within acceptable range. If not, repeat the adjustment procedure, beginning with step 9.
28. When color adjustment is correct, turn off the computer and monitor.
29. Disconnect the power cord and video cable.
30. Replace the rear cover. (See "Replacing the Rear Cover" in the "Series "H" Take-Apart section.)



**FIGURE 10**



**AppleColor Composite Monitor IIe/IIc  
and ColorMonitor IIe/IIc  
Technical Procedures**

**Section 5**

**Illustrated Parts List**

The figures and lists below include all piece parts that can be purchased separately from Apple for the ColorMonitor IIe/IIc, along with their part numbers. These are the only parts available from Apple. Refer to your Apple Service Programs manual for prices.

**Contents:**

**IIe Monitors:**

ColorMonitor IIe, Series "S".....	5.3
AppleColor Composite Monitor IIe and ColorMonitor IIe, Series "H".....	5.5

**IIc Monitors:**

AppleColor Composite Monitor IIc and ColorMonitor II, Series "S".....	5.7
ColorMonitor IIc, Series "H".....	5.9

**Packaging:**

Series "H" Monitors - Packaging.....	5.11
--------------------------------------	------

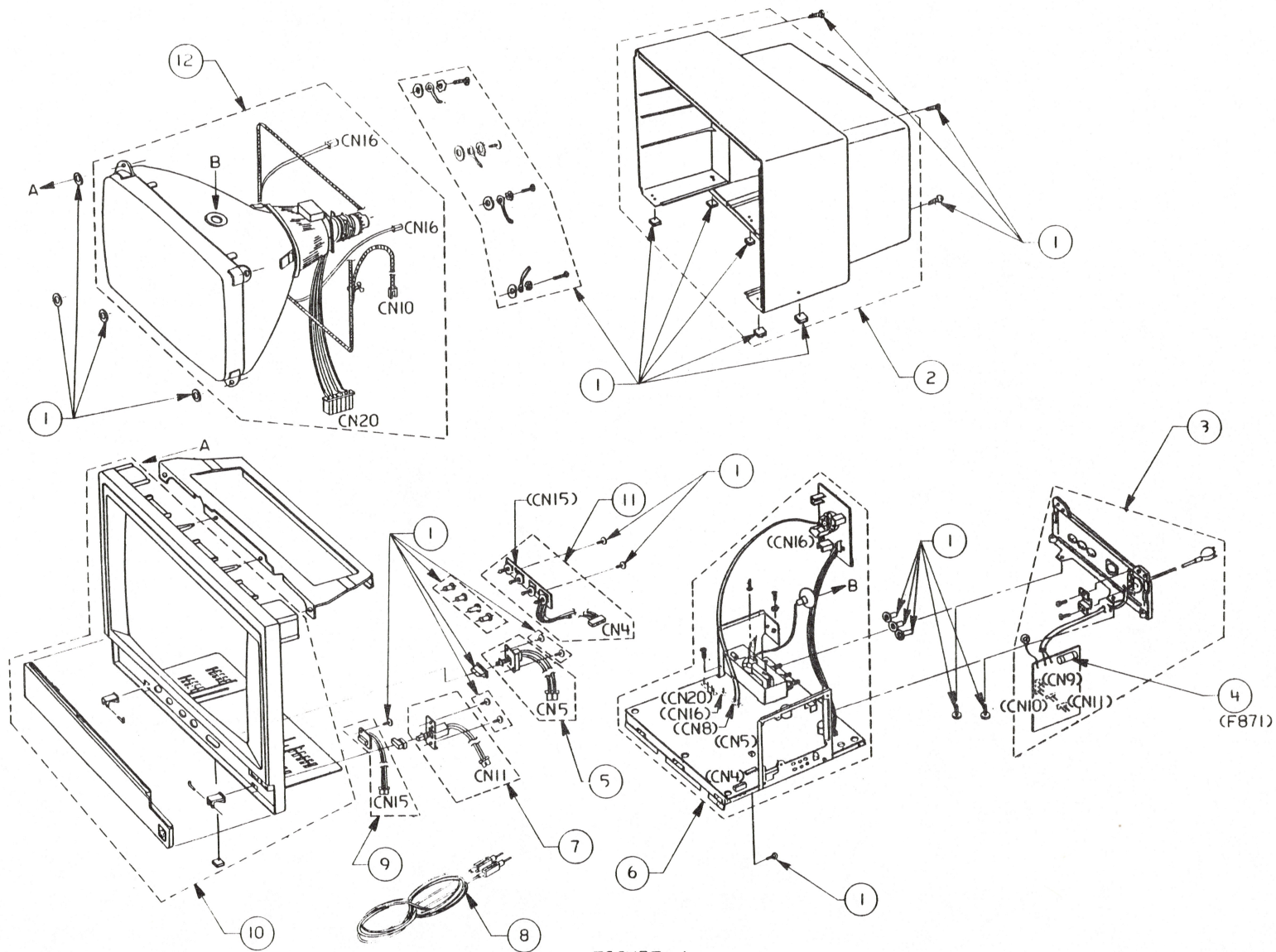
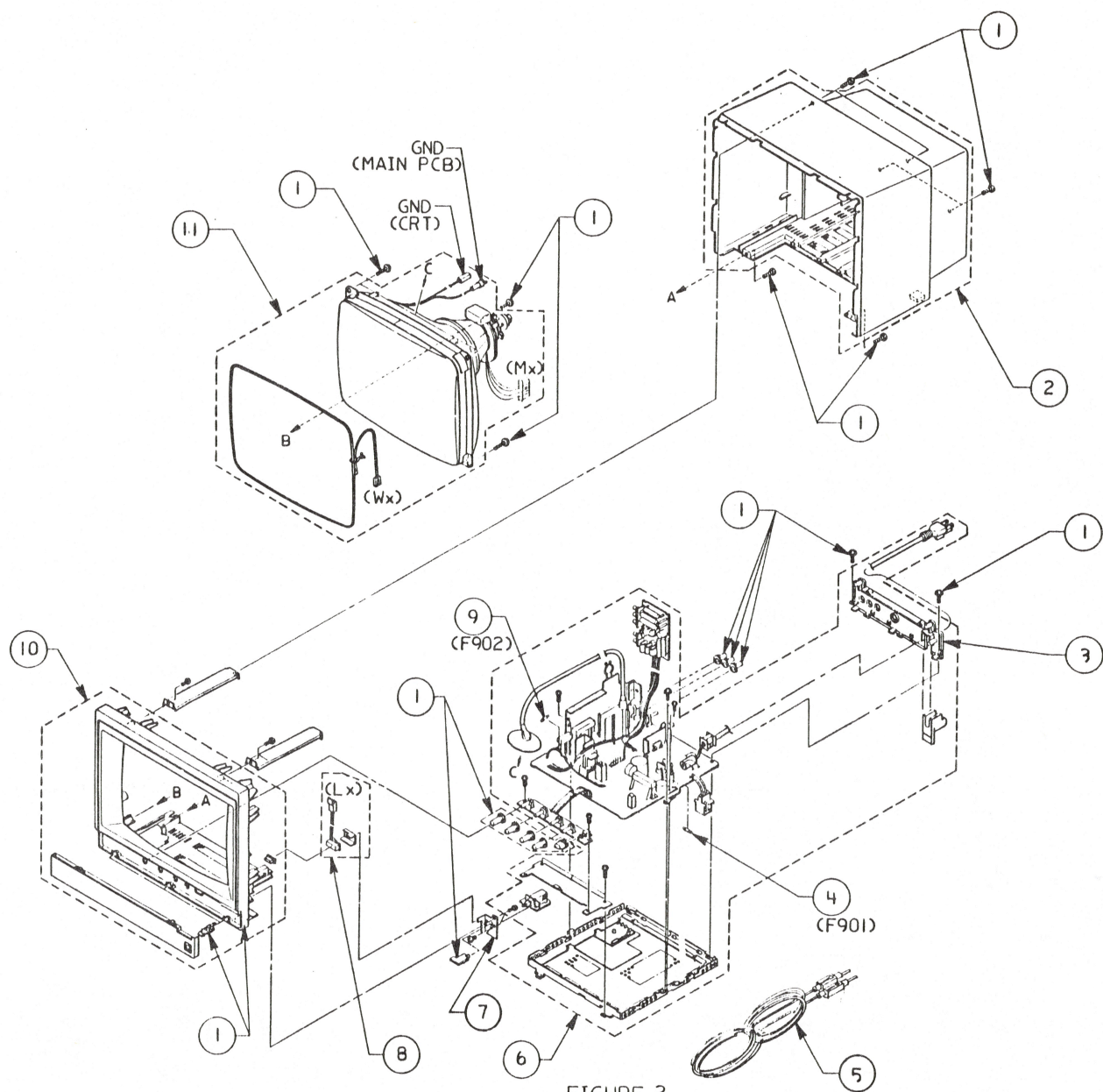


FIGURE 1



# **COLORMONITOR IIe, SERIES "S" (Figure 1)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	956-0001	Screw/Knob Set, ColorMonitor-S
2	949-0019	Rear Cover, ColorMonitor IIe-S
3	970-1278	PS/Panel/AC Cord Assembly, IIe 110V-S
4	740-0102	Fuse, 3 Amp, 3AG, 250V Slow Blow
5	937-0005	Switch, White Only, ColorMonitor IIe,c-S
6	661-0308	Main Logic Board, ColorMonitor IIe and IIc-S
7	937-0006	On/Off Switch, ColorMonitor 110V-S
8	590-0539	Video Cable, Smoke
9	930-0001	LED Assembly, ColorMonitor IIe-S
10	949-0017	Bezel, ColorMonitor IIe-S
11	970-1277	Control PCB, ColorMonitor IIe,c-S
12	076-0173	CRT Assembly, ColorMonitor IIe,c-S





**APPLECOLOR COMPOSITE MONITOR IIe/COLORMONITOR IIe,  
SERIES "H" (Figure 2)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	956-0002	Screw/Knob Set, ColorMonitor-H, Beige
	956-0005	Screw/Knob Set, Composite Monitor IIe-H, Platinum
2	949-0025	Rear Cover, ColorMonitor IIe-H, Beige
	949-0082	Rear Cover, Composite Monitor IIe-H, Platinum
3	949-0103	Rear Panel, Composite Monitor IIe-H, Platinum
4	740-0401	Fuse, Medium Time Lag, 4A, 125V
5	590-0539	Video Cable, Smoke
6	661-0317	Main Logic Board, ColorMonitor IIe-H and IIc-H, Composite IIe-H
7	948-0016	Switch Bracket, ColorMonitor IIe-H, Composite IIe-H
8	930-0003	LED Assembly, ColorMonitor IIe,c-H, Composite IIe-H
9	740-0304	Fuse, 1 Amp, Fast Blow
10	949-0023	Bezel, ColorMonitor IIe-H, Beige
	949-0081	Bezel, Composite IIe-H, Platinum
11	076-0194	CRT Assembly, ColorMonitor IIe,c-H, Composite IIe-H

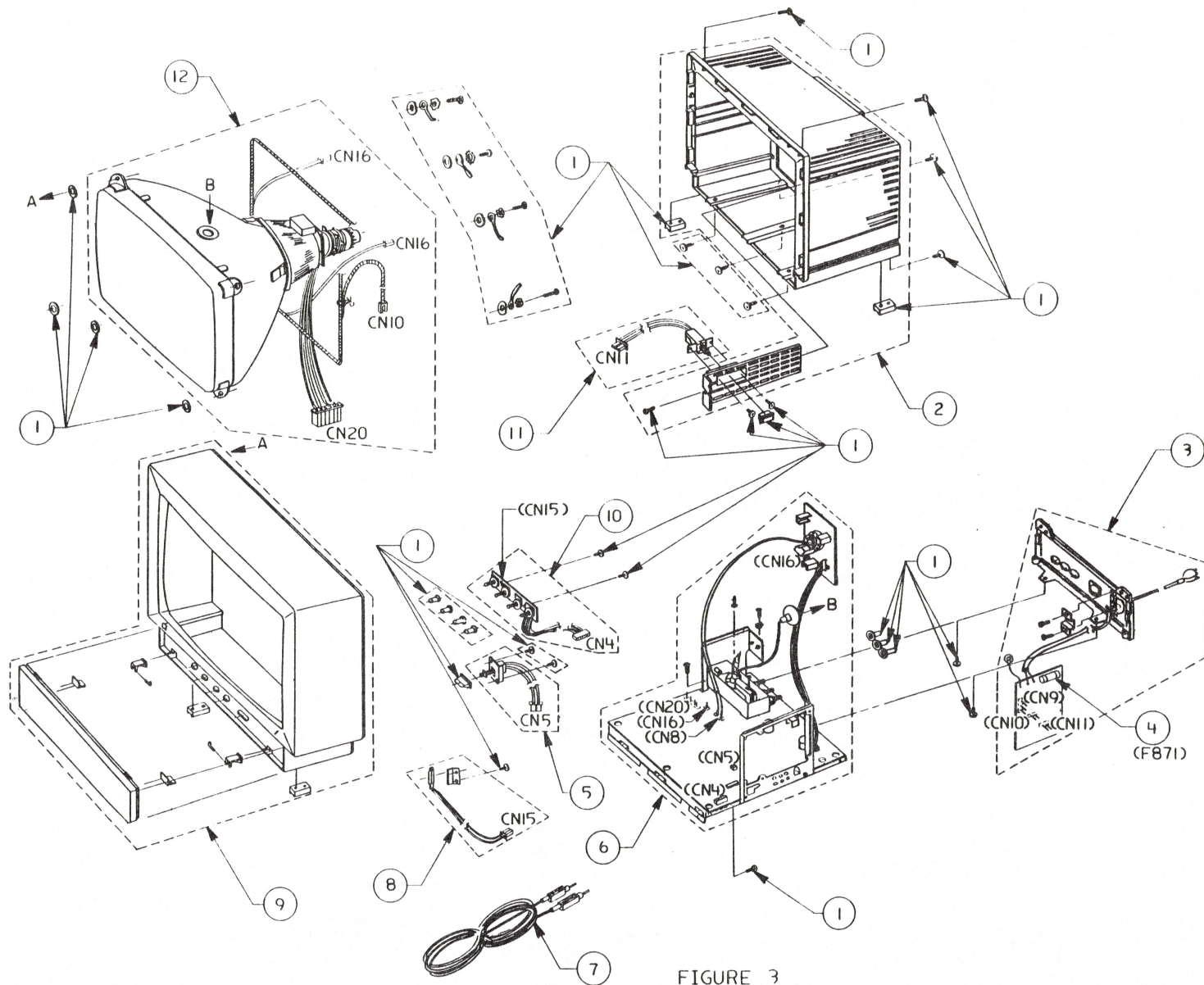


FIGURE 3



**APPLECOLOR COMPOSITE MONITOR IIc/COLORMONITOR IIc,  
SERIES "S" (Figure 3)**

Item	Part No.	Description
1	956-0001	Screw/Knob Set, ColorMonitor-S, Beige
	956-0006	Screw/Knob Set, Composite Monitor IIc-S, Platinum
2	949-0020	Rear Cover, ColorMonitor IIc-S
3	970-1279	PS/Panel/AC Cord Assembly, ColorMonitor IIc, 110V
	970-1305	PS/Panel/AC Cord Assembly, Composite IIc, 110V
4	740-0102	Fuse, 3 Amp, 3AG, 250V Slow Blow
5	937-0005	Switch, White Only, ColorMonitor IIe,c-S
6	661-0308	Main Logic Board, ColorMonitor IIe and IIc-S, Composite IIc-S
7	590-0539	Video Cable, Smoke
8	930-0002	LED Assembly, ColorMonitor IIc-S, Composite IIc-S
9	949-0018	Bezel, ColorMonitor IIc-S, Beige
	949-0077	Bezel, Composite Monitor IIc-S, Platinum
10	970-1277	Control PCB, ColorMonitor IIe,c-S, Composite IIc-S
11	937-0006	On/Off Switch, ColorMonitor 110V-IIe/IIc-S, Composite IIc-S
12	076-0173	CRT Assembly, ColorMonitor IIe,c-S, Composite IIc-S

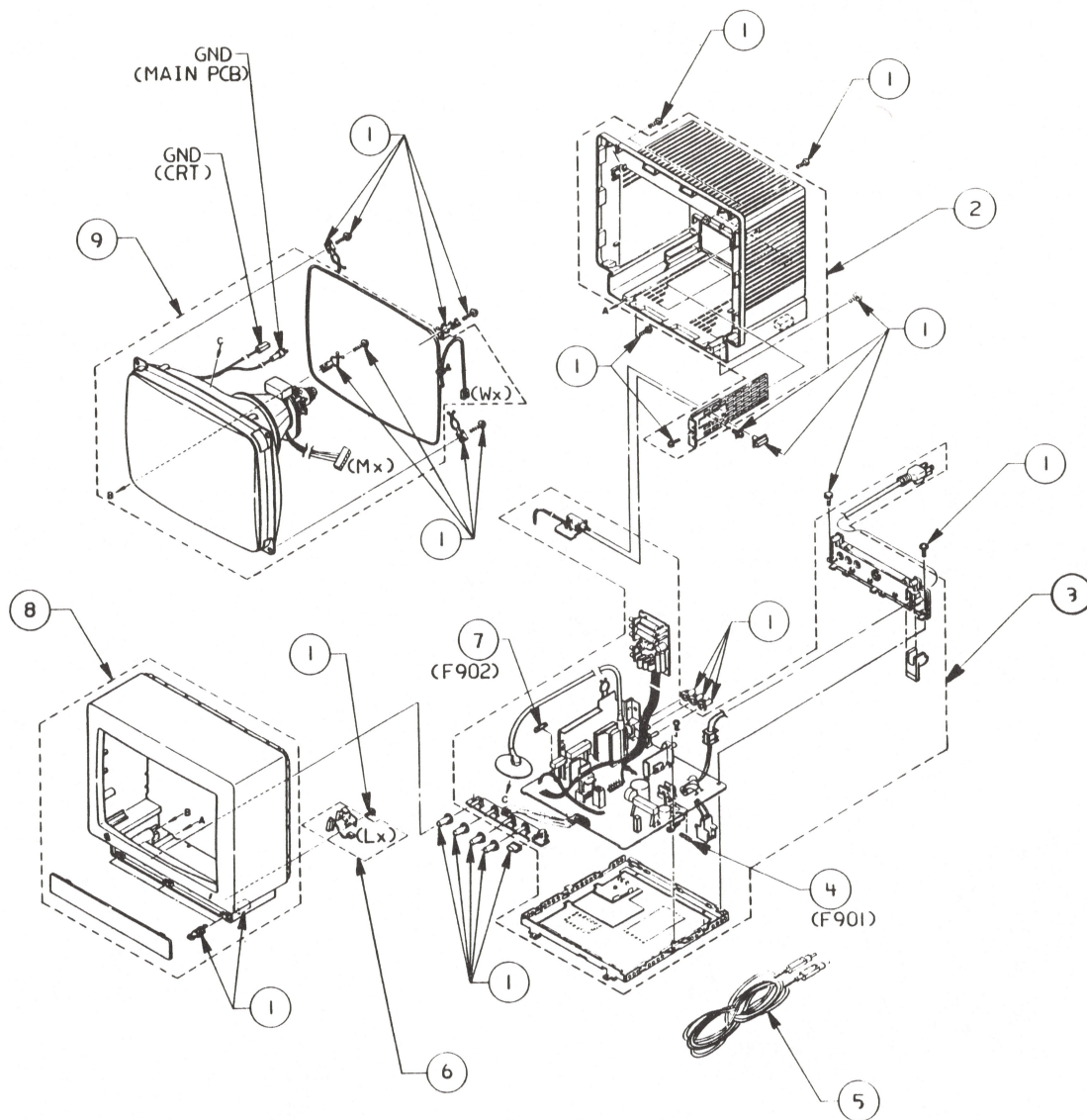


FIGURE 4



**COLORMONITOR IIc, SERIES "H" (Figure 4)**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>
1	956-0002	Screw/Knob Set, ColorMonitor-H
2	949-0026	Rear Cover, ColorMonitor IIc-H
3	661-0317	Main Logic PCB, IIe and IIc-H
4	740-0401	Fuse, Medium Time Lag, 4A, 125V
5	590-0539	Video Cable, Smoke
6	930-0003	LED Assembly, ColorMonitor IIe,c-H
7	740-0304	Fuse, 1 Amp, Fast Blow
8	949-0024	Bezel, ColorMonitor IIc-H
9	076-0194	CRT Assembly, ColorMonitor IIe,c-H

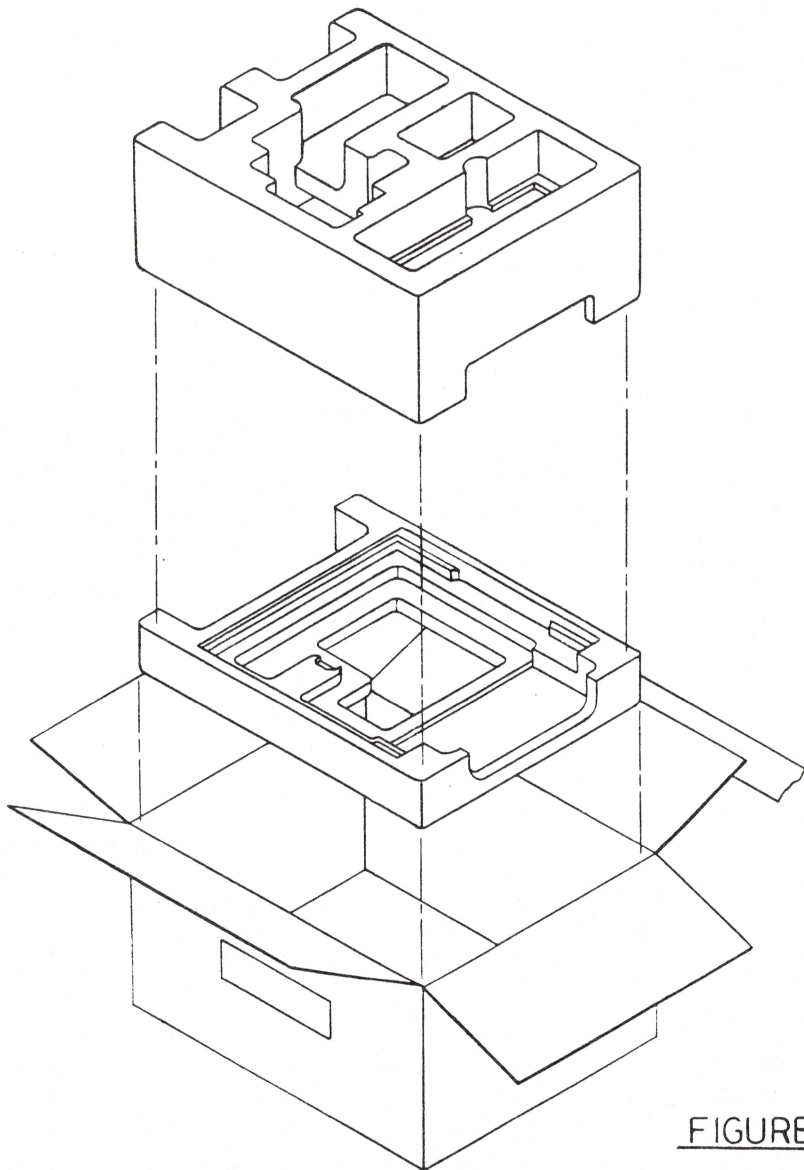


FIGURE 5



**SERIES "H" MONITORS - PACKAGING (Figure 5)**

<b>Part No.</b>	<b>Description</b>
602-0154	Packaging, ColorMonitor IIe/IIc-H, Composite IIe-H